

FRIDAY, SEPTEMBER 6, 1895.

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#### Contributions.

### A Paineful Reflection upon the Editor.

TO THE EDITOR OF THE RAILROAD GAZETTE

The generally flattering terms of your editorial in the issue of Aug. 30 make it difficult for me to positively and without reserve say that you are wrong, but that is what you are. In the first place, I did not even imply in my Philadelphia paper on signaling that the change in the colors of semaphore blades is desirable in that it would help an unpractised eye to find its way. Heaven help a man (and his train) who tries to make fast time over an unknown road; for next to leading a forlorn hope, it is the riskiest thing I can conceive of. Try it some time; sit on the right hand box of a locomotive cab and endeavor to interpret the signals as you come to them on the best signaled railroad in this country; analyze your sensations and then see where you are at. The unpractised eye has no business as an engine runner and the pilot's job is still safe; it is for the practised eye that the change is advocated and the more practised the better. The trouble is that en-ginemen will worry along, year after year under bad conditions without more than an occasional growl until the interest of one in authority is aroused by some untoward circumstance. It is a good thing for un-practised eyes to ride upon locomotives frequently; and they should be the superintendent's eyes. Then he will see the difficulties that his enginement have to contend with. He will, perhaps, magnify the difficulties a little, but that is what is wanted. If he counts too much upon an office supervision he is apt to disregard what, at first sight, seem like small matters and something is needed to counteract this tendency. Geo. H. PAINE. to counteract this tendency.

### Minimum Weights for Freight in Large Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read your editorial of Aug. 23 telling of the confusion now existing in the practice of the railroads of this country in dealing with furniture cars, and setting forth the necessity of making rates for transportation of goods in these cars which shall have some reasonable adjustment to the weight and quantity of 'reight carried. It is to be hoped that the agitation of this subject will be kept up until some of the violent inequalities in rates now existing shall have been changed. Unfortunately, many traffic managers, and especially many district and traveling freight agents, seem to have but a very poor appreciation of the evil which results from the practices that they indulge in and encourage.

With your permission, and at the rick of repeating ossibly some of the things that you have already said, I will state some of the difficulties which are now encountered nearly every day, especially in the West, by a gen-eneral freight agent who wishes to do business by legitimate methods.

Classification, tariffs and commodity rates have b amended from time to time so as to provide for a low rating on bulky articles with a fictitious minimum as condition, which minimum in most cases provides for a larger quantity of freight than can be loaded in ordinary cars. In these modern times railroad improvements, especially roadbed and motive power, have resulted in the construction of box-cars larger and larger each year that there is no uniformity as to dimensions. In addition to this there is still a greater difficulty, which has arisen from the fact that cars of extraordinary dimensions have been constructed for the accommodation of special lines of business—carriages, furniture, agricultural implements, etc. The construction of cars for special assignment has gone on from year to year with out concert of action between carriers, the last cars built being generally larger than any that have preceded them, so that each of the principal roads in the West have large equipment without effort at uniformity.

The consequence is that on bulky articles the shipper cannot tell what he will have to pay per hundred pounds actual weight until he obtains the car in which to load his freight. Large cars will more nearly contain the minimum than smaller ones. In some cases the large cars will contain the minimum, but no one company has a sufficient number of extraordinary large cars to accommodate its patrons. They must distribute what they have as impartially as possible, but unless all shippers can be served alike there is necessarily great discrimination. To increase the number of large cars sufficiently to meet all demands would make the large equipment now in service useless for this class of freight. A manufacturer located at a local station on one road is in competition with another located say from 10 to 15 miles across the country on another road. One gets a large car, the other gets a small one; the result is easily seen—dissatisfaction growing out of indefensible irregularity of rates

Furthermore, the cost of service to the carrier is increased sometimes a hundred-fold above what it should be. A railroad which has from fifteen to twenty thousand box cars 34 ft. long, with height and width in proportion, may have from 50 to 250 larger cars, which must be sent long distances empty to stations at which there is a sufficient number of ordinary cars; and these should be as desirable for the traffic as the larger cars, but they are, in fact, useless. The difficulties arising from these conditions affect a very large territory. They are felt at every station from which is shipped hay or straw, or from or to which is shipped light or bulky articles, agricultural implements, etc.

To illustrate: There are a great many light buggies which are shipped boxed or crated, that weigh 400 lbs. ach. A 34-ft. box car will contain 12 buggies, actual weight 4 800 lbs. A car 1 ft. longer and 9 in. higher will contain 24 buggies. The carload rate on buggies from Chicago to the Missouri River is 34 cts. per 100 lbs., with a minimum weight of 20,000 lbs. A manufacturer who has to accept the smaller car pays just twice the amount of freight for a buggy as the one who gets the larger

Repeated efforts have been made by managers to agree upon a standard car, but so far without success, and it is by no means certain that such a proposition, if it met with success, would be in the interest of the carriers or with success, would be in the interest of the carriers or be of benefit to the shippers, because the tendency under improved methods is to increase the carrying capacity of cars and the power of locomotives. If the capacity of cars is to be increased, the carriers certainly are entitled to their share of the profits arising from more economical methods.

A solution of the question that will impose no hard-ship upon the public is to be found in the direction of such classification and minimums as will place all shippers on an absolute equality, and this can only be done under existing conditions by making an ordinary car as desirable [by a correspondingly lower rate] for any business as a car of extreme dimensions constructed for the special accommodation of a particular class of business. Unless we do this, there will be a constant tendency to provide a large supply of big cars, and then when times are dull we shall have that many more idle-cars than we have now. Unless we begin a reform, this kind of rate cutting will spread and grow worse. Hundreds of shippers are constantly on the look-out for concessions in their favor, and they are at all times ready to stand in with the agent of the reckless road who will take underhanded means to give them an undue share of the available supply of large cars.

B. C. S.

The remark of B. C. S. about idle cars suggests that under some circumstances, the rate for bulky goods in cars of ordinary size ought to be even lower than for the same in large cars. The chief legitimate argument for large cars is economy of transportation, but where a road has two medium-size cars going to a certain place empty it can well afford to give up both of them for a 10-ton load of furniture rather than build a large car to take in the whole of it, and still haul the two common cars to the same destination. -EDITOR RAILROAD GAZETTE.

# The Reactions of Partially Continuous Drawbridges.\*

BY MANSFIELD MERRIMAN,

Professor of Civil Engineering in Lehigh University. A partially continuous truss is a structure intermediate between a continuous truss and a series of simple trusses. Many drawbridges are fully continuous over the middle pier; some are arranged so that when closed each span is a simple bridge independent of the other

while a third class has partially continuous trusses.

Any continuous truss may be rendered partially con tinuous with respect to shears by omitting the diagonals in panels over the piers. It may also be rendered par tially continuous with respect to moments by inserting joints in the chords. If a sufficient number of such breaks in webbing and chords be made, a continuous truss can be divided into a number of simple and over hanging spans, as is done in the cantilever system of bridges. A two-span drawbridge can be rendered partially continuous with respect to shears only, while a three-span drawbridge can be made partially continuous with respect to moments, and in some cases with respect to both shears and moments.

\*A paper read before the Section of Mechanical Science and figureering of the American Association for the Advance-ment of Science at the meeting held in Springfield, Mass., Aug.

When the reactions of a truss due to assigned loads are known, the stresses are readily computed by the principles of statics. The entire problem of continuous and partially continuous structures is thus referred to the determination of the receiver of the r the determinations of the reactions of the supports. is sufficient in all cases to be able to compute the re-actions due to a single concentrated load having any position on the bridge.

Nearly all cases of partial continuity in drawbridge trusses are such that the unknown reactions are one more in number than the apparent conditions governing them. An additional condition is hence needed, and this is furnished by the principle of least work. This important principle asserts that the reactions will be such as to make the total work of the internal stresses the least possible. It may, indeed, be regarded as an axiom that the work of any system of resisting stresses will not be greater than the minimum which is necessary to

maintain equilibruim.

By the application of this principle I have deduced formulas for the reactions in the most common cases of drawbridge trusses with partial continuity. The truss is regarded as a beam of constant cross-section, and thus the resulting formulas have the same validity as those generally used for continuous trus

A SWING DRAWBRIDGE.

Fig. 1 represents a swing drawbridge rendered partially continuous by the omission of the diagonals in the panel over the pier, the sheer in that panel being always zero. Let the supports B and C rest upon a rim-bearing turn-table, and let the truss be latched down at the ends Aand D. Let the lengths of the spans A B and C D be each equal to l, and let the length of B C be n l, where nis a number less than unity. Let a single load P be placed upon the span A B at a distance k l from the



abutment A, the letter k representing any fraction less than unity. It is required to determine the reactions A, B, C, and D, due to the load P.

Since there are tour unknown quantities, four con-

ditions are needed to determine them. The principles of static equilibrium furnish two conditions; first, the sum The principles of

$$A+B+C+D=P,$$

of the reactions is equal to the load, or, A+B+C+D=P, and second, the sum of the moments of the reactions about any point is equal to the moment of the load, or taking moments about the left end,  $D\left(2\;l\,+\,n\;l\right)\,+\,C\left(l\,+\,n\;l\right)\,+\,B\;l\,=\,P\;kl.$ 

$$+ n l) + C (l + n l) + B l = P k l$$

The third condition is that no shear can be transmitted through the middle panel, or,

le panel, or,
$$A + B - P = 0,$$

and the fourth condition is that the total internal work of the stresses in the truss shall be a minimum.

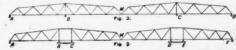
To develop the fourth condition reference must be made to works on the mechanics of beams where it is shown that the total internal work of the stresses is proportional to the sum of the squares of all the bending moments. Now Ax is the bending moment at any point on the left of the load, and Ax - P(x - kl) is the bending moment at any point between the load and the support B; also Dl is the bending moment in the middle panel, and Dx is that for any point in the span CD.

$$\int_{0}^{kl} A^{2} x^{2} dx + \int_{kl}^{l} (Ax - Px + Pkl)^{2} dx + \int_{0}^{nl} D^{2} l^{2} dx +$$

 $\int D^2 x^2 dx = a \text{ minimum, is the mathematical expres-}$ 

sion of the fourth condition.

The algebraic operations for deducing the values of A, B, C and D, from these four conditions need not be given here. The best method is to find the values of B, C and D, in terms of A from the first three conditions, then integrate the fourth expression between the limits indi-



ated, and substitute the value of D in it. Thus the quantity to be made a minimum contains only one unknown reaction, A; by the usual method the value of A. which reaction, A, by the usual inclined the value of A, which renders the expression a minimum is obtained, and then the values of B, C, and D follow. The results are

$$A = \frac{P}{4 + 6n} \left( 4 + 6n - (5 + 6n) k + k^{3} \right),$$

$$B = \frac{P}{4 + 6n} \left( (5 + 6n) k - k^{3} \right),$$

$$D = -C = \frac{P}{4 + 6n} (k - k^{3}),$$

and these are the reactions for the case of partial con-

and these are the reactions for the case of partial continuity shown in Fig. 1.

As a numerical example, suppose that the spans AB and CD are each 60 ft., and that BC is 20 ft. Then n is the ratio of BC to AB, or  $n=20+60=\frac{1}{26}$ . Now let a load of 1,000 lbs. be on the span AB at a distance of 30 ft. from the left end. Then P=1,000 lbs., and  $k=30+60=\frac{1}{26}$ . Substituting these values in the formulas, the reaction A is 4374 lbs. B is 5824 lbs. while C and D are reaction A is  $437\frac{1}{2}$  lbs., B is  $562\frac{1}{2}$  lbs., while C and D are each  $62\frac{1}{2}$  lbs., C being negative and D positive. Here the reactions A and B are intermediate in value between those of a simple truss and a fully continuous one.

#### A DOUBLE ROLLING DRAWBRIDGE.

Fig. 2 represents a drawbridge truss rendered partially continuous when closed by a joint at M which can transmit shears but not moments. The span BC is over the waterway, and when this is to be opened the locking pins at M are removed, and the two parts, together with their supports, are rolled back toward the left and right. When the bridge is closed the ends A and D are latched down so that they cannot rise under the action of live load on the span BC. Let the span AB and CD, and the arms BM and CM, be each equal to l. It is required to find the four reactions due to a load P placed at any

point on the bridge.

Case I.—Let the load P be on the span AB at a distance kl from the left support, k being a number whose value may range from 0 to 1. Here four conditions are necessary to determine the four unknown reactions. The two static conditions are that the sum of the reactions equals the load, and that the sum of the moments of the reactions equals the moment of the load with respect to any point. The third condition is that of partial continuity, namely, that there can be no moment at M, whence,

 $D \times 2l + C \times l = 0$ , or 2D + C = 0.

The fourth condition is that of least internal work, namely, that the sum of the squares of all the bending

which are the reactions due to a load Pon the arm CM of Fig. 3. If in these n be placed equal to zero, the reduce to the case of Fig. 2; thus B + C in Fig. 3 become of Fig. 8. to zero, they B in Fig. 2.

#### CONCLUSION.

The usual method of computing a truss like Fig. 1 under live load is to regard the span AB as a simple beam for all loads on that span, while for a load over the whole length it is taken as a continuous beam on four The investigation here given, however, show suppores. The investigation here given, nowever, shows that owing to the partial continuity the reaction A due to the load P is less than for a simple beam. Hence the

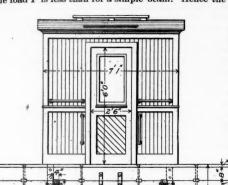


Fig. 1 shows the car body, cab, etc., and F 3 the special suspension for the 50 H. P. motor on the Taylor Empire State radial truck. This truck, as used on the car in question, has a 5 ft. 3 in. wheel base, and as it is a center pivot truck, and as the bolsters come down very

center pivot truck, and as the bolsters come down very low, it was necessary to make a special suspension, as shown in the engraving. Fig. 2 shows the air compressor which runs at 85 revolutions a minute, and delivers 2,600 cu. in. of air a minute at 60 lbs. pressure.

The length of the car from out to out of end sills is 36 ft. and the width 8 ft. 9¾ in. The side sills are of Georgia pine 5 in. × 12 in., while the center sills are of white oak 4½ in. × 8 in. The two end sills, which are 8 in. × 8 in. × 9 ft. 1¾ in., are also of white oak, and the four intermediate sills are of Georgia pine 4½ in. × 8 in. Georgia pine is also used for the flooring 1¾ in. thick. The dead and buffer blocks are secured to the end sill by The dead and buffer blocks are secured to the end sill by the middle truss rods, which are 1½ in. round iron in two parts connected at the center with a 1¾ in. wrought iron turnbuckle. The rods are set on a cast iron saddle supported by the top half of the cast iron body bolster. The car is equipped with the Westinghouse quick-

action automatic air-brake. The engineer's valve is lo-cated in the cab and the main reservoir is under the cabwith the auxiliary reservoir parallel to the brake cylin der. Piping extends to both ends of the car. Drawbars der.

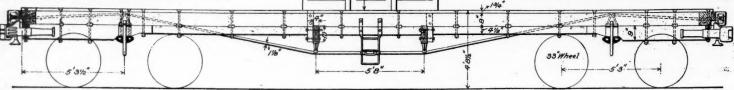


Fig 1.-Electric Motor Car for Carrying Stone Made by THE WALKER MFG. Co., Cleveland.

movements shall be zero. Stating this in a similar manner as above, and making the solution, there results:

$$\begin{split} A &= \frac{P}{8} \, (8 - 9k + k^3), \\ B &= \frac{P}{8} \, (10 \, k - 2 \, k^3), \\ C &= -\frac{P}{8} \, (2 \, k - 2 \, k^3). \\ D &= \frac{P}{8} \, (k - \dot{\kappa}^3), \quad . \end{split}$$

which are the reactions due to any load P in the first

span of Fig. 2.

Case II.—Let the load P be on the arm BM, at a distance kl from the point B, where k is any fraction less than unity. The first and third conditions are the same than unity. The first and third conditions are the same as before, while the second and fourth slightly differ owing to the different position of the load. Solving as before, there are found the results:

$$A = -\frac{P}{8} (6k - 3k^2 + k^3),$$

$$B = \frac{P}{8} (8 + 4k - 6k^2 + 2k^3),$$

$$C = \frac{P}{8} (4k + 6k^2 - 2k),$$

$$D = -\frac{P}{2} (2k + 3k^2 - k^3),$$

which are the reactions due to a load P on the arm BMof Fig. 2. If k = 0, the load is at the point B, and the re action there is P, while each of the others is zero. k=l, the load is at M, and the reactions B and C? Tf equal to P, while A and D are negative, and each equal to 1/4 P.

# A DOUBLE SWING DRAWBRIDGE.

Fig. 3 represents the usual case of a double swing draw-bridge truss with partial continuity, both as to shears and moments, under the action of live load. There being no diagonals in the panels over the piers, no shears can be transmitted through those panels. There being a hinge at the middle, no moments can exist at that a hinge at the middle, no moments can exist at that point. Let the turntable be rim-bearing, and let the ends A and F be latched down. The most common arrangement is that where AB, CM, MD and EF are all equal in length, and the reactions for this case will be given here. Let each of these lengths be l, and let BCand DE be nl, where n is a number expressing the ratio of BC to AB.

Of the six conditions required, two are furnished by statics, two are furnished by the requirement that there are no shears in the panels over the piers, one is furnished by the requirement that there is no moment at M, and the sixth is given by the principle of least work. These six conditions determine the values of the six reactions.

Case I.-Let the load P be on the span A B, at a distance, kl, from the left support, k being any number less than unity and l being the length of the span. Then,

$$A = \frac{P}{8 + 12n} \left( 8 + 12n - (9 + 12n) k + k^{2} \right)$$

$$B = P - A.$$

$$C = F = Pk - A,$$

D = E = -Pk + A,which are the reactions due to a load in the first span of

Case II.—Let the low P be on the arm CM at a distance kl from the point C, where k is a fraction less than unity.

$$-A = B = \frac{P}{8 + 12n} \Big( (6 + 6n) k - 3k^2 + k^3 \Big),$$

$$C = B + P (1 - k),$$

$$D = E = -F = Pk - B,$$

stresses found by the old method are too large near the ends of the truss and too small near the middle pier.

In all the above instances the theory assumes that the

supports are on the same level, or rather that the truss is without initial restraint with respect to the supports, as it is to this case that the condition of least internal work applies. This condition, in fact, at once determines the reactions for a continuous beam of two spans on level supports, giving the same results as found by the

theorem of three moments.

When the span AB, in Fig. 3, is not equal in length to the arm CM, as sometimes happens, the formulas for the reactions become more complicated, as they contain a quantity expressing the ratio of these two lengths. These formulas have been deduced and will be given in

a forthcoming volume on higher bridge construction.

The principle of least internal work which has here been used, is a fundamental one in the economy of na ture, and during the past 10 years it has been much employed in the discussion of complex questions of stresses A formal demonstration of its truth is not easy to give, and, like many other concepts of mechanics, its ultimate verification must rest upon experience. For the investigation of cases of partial continuity in drawbridge trusses it is seen to be a valuable principle in establishing reliable formulas for the reactions which heretofore e generally been computed under assumptions known to be incorrect.

# Walker Electric Gondola Car.

Herewith we show engravings of an electric gondola car built by the Walker Manufacturing Co., of Cleve-land, O., for use on a road running between Toledo and certain stone quarries near that city. It is intended to

of the Gould type are used, equipped with the Butler drawbar attachment and a coupling lever operated from the side of the car.

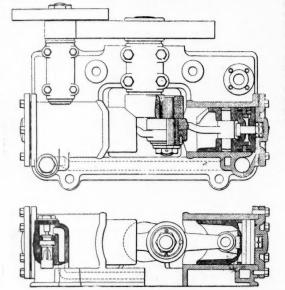
The cab in the center of the car is 7 ft, high and 7 ft, 1 in. long. It has sliding windows at each end, enabling the engineer or motorman to see the track in both directions. The corner posts for the cab extend through the floor and are bolted to the intermediate sills, and to the needle beams, with two % in. bolts. All the woodwork is painted with standard liquid freight car paint, the exposed iron work being finished with asphaltum gloss black paint. This car is interesting from the fact that it shows another of the many special classes of work for which electricity has been found better adapted than steam.

# The Car Ferry on Lake Michigan.

On Thursday, Aug. 29, the first ferryboat, or more properly transport, of the Lake Michigan Car Ferry Transportation Company, left the dock at South Chicago on its initial trip to Peshtigo, Wis., with a full load of its initial trip to Peshtigo, Wis., with a full load of 28 cars. The trip was made in 26 hours, although part of the time a neavy wind was blowing. The route is north on Lake Michigan to the government canal, across the small peninsula between Green Bay and Lake Michigan. Passing through this canal and across Green Bay the landing will be made at Peshtigo harbor. The total distance is about 240 miles.

At present there are two boats, each having a capacity for carrying 28 freight cars. The second boat has just been completed, and makes its first trip this week. They have no motive power but will be towed by a powerful tug. Both ferryboats are built of wood and iron and are

of stout seaworthy construction. They will draw 7 ft. of water when loaded. They have four tracks of 75-lb. rails laid on longitudinal stringers. Between the tracks and outside the two outer tracks are laid lines of 60-lb. rails running their entire length. On these rails are castiron clamps, to which are attached iron rods, furnished with turn buckles. On the opposite ends of these rods are other clamps, which fasten to the side sills of the cars. Four of these fastenings will hold each car firmly to the tracks to prevent them from tipping over. The cars are



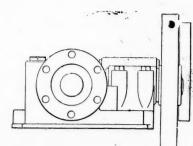


Fig. 2.-Air Compressor for Brake on Electric Freight Car.

propel itself, and, in addition, two or three ordinary run on to the boats from the stern, which is square at proper itself, and, in addition, two or three ordinary freight cars loaded with stone. The motor car will also be loaded.

The car has a capacity of 60,000 lbs., and is equipped with two 50 H. P. single-reduction motors as shown

to the intermediate lines of rails. In this way motion along the track is prevented. Bulwarks 4½ ft. high, extend around the boats, with the exception of the bow and stern. At the bow is a small double deck cabin, which contains the boilers and engines for operating the windlass, etc. The pilot house and quarters for the crew are also here. At the stern the bulwarks are cut away to permit the loading of the cars. The boats are 316 ft. long and 44 ft. wide.

At the docks are counter weighted bridges which can be raised or lowered to the deck floor of the boats. Two

placed in the Fifty-second street cable station, and drives the cable on the south end of the State street line, con-sisting of three miles of double track. This end of the line was fixed up as an experiment, and so far the motor has given perfect satisfaction. The new arrangement is more economical than the old, for the same reason that centralized power generation is cheaper than subdivided power generation. The cost of fuel for the double conversion of energy, allowing for 17 per cent. loss, will probably be \$7 to \$8 a day. To run the cable mctor requires no increase of the pay roll in the electric plant as

0 8

Fig. 3.-Special Suspension for Walker 50 H. P. Steel Motor.

tracks and the necessary switches to make connection the power units are so large. The same is true of oil and with the four tracks on the boats are on the bridges, the incidentals. Practically the only loss will be the extra

This ferry line forms a part of what is to be now called the South Chicago Route, which is formed by the ferry line and the Wisconsin & Michigan Railway. The main line of this road extends between the Faithhorn Junction, Mich., on the Minneapolis, St. Paul & Sault Ste. Marie Mich., on the Minneapons, St. Paul & Sault Ste. Marie Railway on the north; and Peshtigo Harbor on the South; at which point connection is made with the ferry line to South Chicago. The time between Peshtigo and South Chicago is about 24 hours. At South Chicago arrangements have been made with

the Chicago & Western Indiana belt line to deliver cars to the Eastern and Southern roads. The Chicago, Rock Island & Pacific has direct connection with the ferries. All property sent by this route will be insured as by any rail line.

# Susemihl's Side Bearing.

Mr. F. G. Susemihl, Mechanical Engineer of the Mich igan Central at Detroit, who has long made a study of the best means of making a car run smoothly around a curve, and who has devised various improvem ents in the curve, and who has devised various improvements in the ordinary curve plate, has recently taken out, in conjunction with Mr. A. Torrey, Chief Engineer of the road, a patent on an improved roller bearing, which is described in the accompanying illustrations.

The most prominent feature of this bearing is a guide bar, AC, pivoted to an interposed carriage, E, which rests upon two rollers. There is a top and a bottom casting, one bolted to the transom of the car and the other to the bolster of the truck. The carriage is of one piece of malleable iron and the rollers, of chilled cast-iron, are cone shaped. The guide bar, of wrought iron, is pivoted to the top casting at A, and the lower end, C, is pivoted in a suitable socket. Pivots on the side of the bar B engage in vertical channels in the carriage, and thus force the latter always into the middle position between the upper and lower bearings. The guide bar, AC, is inupper and lower bearings. The guide bar, AC, is inserted from above, and when the transom is bolted to the top casting the carriage, with the rollers, is absolutely locked to the car. If the car is jacked up the carriage, rollers and guide bar hang to it.

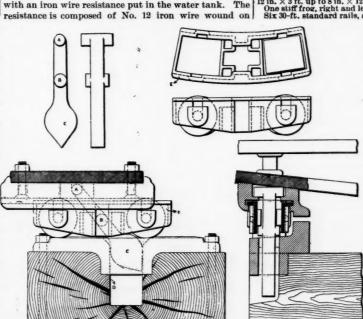
When the car passes around a curve the rollers travel the same distance forward on one plate as backward on the other. The lower pivot of the guide bar has a pointed extension, and the bolster is mortised to give room for it. This mortise is open at the bottom to give free exit to sand or other obstructive material which may get into it.

A passenger car with these bearings has been running for many months on the Michigan Central between De-troit and Bay City, and that road is now equipping more

# An Electrically Driven Cable Road.

The Chicago City Railway Company is now using an electric motor to drive the two lengths of its cable on State street, south of Thirty-ninth street. This company has been engaged for the past two months in enlarging its electric plant at Fifty-second street, that it migh have sufficient electric power to drive its cables. This seems to be the first instance on record where surface cable roads have adopted electricity for driving the cables. The motor used is a 700 H. P. Westinghouse,

fuel mentioned. Against this is a saving which is due to the closing down of the boilers and engines in the cable plant. The saving in labor resulting from this is \$28. To this must be added the saving in oil, repairs and incidentals which is made when the steam plant is shut down. This is figured at \$7 a day so that the net saving by operating the cable motor is \$28 per day. The ammeter shows a great variation in the power required to pull a cable, the variation being much more sudden and violent than with an electric road using the same amount of power, though the variation is not nearly so violent as on many small electric roads. It is not uncommon for the amme ter pointer to show a rise or fall of 300 amperes in 20 sec onds The motor is shunt wound and the rheostat is placed in the shunt field. To avoid any danger of the shunt field puncturing the armature insulation by its high voltage discharge when the circuit breaker opens, a non-inductive resistance is put in shunt to the fields so that the fields will discharge through it in preference to the armature. This and the field regulating resistance is put behind the switchboard. The motor is started with an iron wire resistance put in the water tank. The



Susemihl's Side Bearing for Passenger and Freight Cars.

One of these is con-There are two circuit breakers. nected in the main circuit in the ordinary manner and goes out on a short circuit. The other has its current-breaking switch connected in the main circuit, but electric call bells with the nearest signal tower.

the magnet which opens it is connected between the first two segments of the rheostat, so that when the motor is shut down gradually with the rheostat the final break of the circuit is made by the circuit breaker and there is no are on the rheostat segment. The switchboard also has a double-pole double-throw switch for reversing the motors a double-pole field, switch and Wester and the motors, a double-pole field switch and Weston ammeter. The cable motor is connected with one of the feeder panels of the electric plant and is run just as any other feeder. It is the intention to make a thorough test of this motor and if the expected saving is realized the entire State Street line will be run in this manner. So far the motor has shown itself amply able to do the work required and the project is being watched with much interest by other cable companies.

#### Equipment of a Wrecking Train.

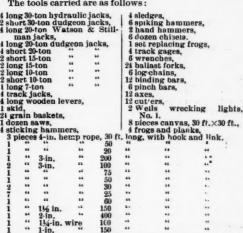
BY W. S. SCOTT.

The proper organization, selection and arrangement of tools on a wreck train is one of the essential features for the prompt opening of the main tracks after a s

The following is a description of the force and equipment of a wreck train on a mountain division of one of our trunk lines where when a wreck occurs the damage to both the rolling stock and track is likely to be serious

The men are under the jurisdiction of the supervisor of roadway and are employed on a work train. The crew consists of a conductor, a flagman and an average of 25 men. They all live in the neighborhood of the wreck train headquarters and as their houses are connected with electric call bells they can be quickly called out. The average time required to start the crew out is about 30 to 40 minutes from the time the order is received. Twenty minutes is the best time yet made. There is a hostler who is detailed to look after the engine and consequently at night the engine is kept under steam.

The train is made up as follows: One derrick car, crane style, two cabin cars, and as many flat cars as occasion One of the flat cars is always kept loaded with requires. tandard 60,000 lbs. capacity trucks. The tools carried are as follows:



complete set of telegraph instruments is always carried on the wreck train, and for all large wrecks an operator is taken along. His duty is to cut the wires and establish a telegraph office at the scene of the accident, thus facilitating the movement of trains as soon as the track is opened, also keeping the superintend-ent's office fully advised as to the progress of the work of clearing the

and spring frog. es. bolts and splic

wreck. Hot coffee is served to the men in winter time at fre-

quent intervals. Each man is assigned a cer tain duty and is thoroughly drilled in all its details, especially so in regard to hand-ling jacks, raising cars, re-placing them on the tracks. handling the derrick and the care and proper method of handling the Wells lights. By this means on arrival at a wreck each man, being thoroughly conversant with his duties, there is no con-

mis duties, there is no confusion. There is one man wooden spools and connected three in parallel. Water stationed in each cabin car and he is held responsible can be circulated through the tank to keep the wire for the care of all the tools under his charge. It is one of his special duties to see that the hydraulic jacks are ning, this is not done on account of the ample size of the rheostat. The tank is  $3 \times 3 \times 10\%$  ft.

There are two circuit breakers. One of these is not confusion. There is one man for the care of all the tools under his charge. It is one in proper working order before he allows them to be taken from the car. In case a rope is broken it is taken to the cabin car, where the man in charge repairs it by splic

foreman of the section on which a wreck occurs is called at once and proceeds with his gang to the scene of the accident. As soon as enough of the wreck is removed to allow him to work on the track he begins the necessary repairs and follows up as fast as the damaged cars are removed, so that he usually has the track ready to allow trains to proceed when main tracks are cleared.

When a wreck occurs the conductor of the train notifies the superintendent's office by wire using a printed form with a list of questions as below.\* The Superintendent's Office by wire using a printed enabling passengers arriving at the Waterloo station of the London & South Western Railway, to quickly reach tendent orders out the wrecking force and notifies the the city of London proper. To provide this, the Water-

 What west-bound for same cause?
 Remarks:—Stating nature of accident.
 A supply of report blanks is k pt on hand at all telegraph offices.
 AT In transmitting the report, operators give the numbers of the questions only.

# The Waterloo and City Tunnel, London.

There has long existed a need for some means of

loo & City Railway Co. was formed, and a tunnel begun, the route of which is shown the accompanying map This tunnel, through which it is intended to operate an electric line, is being built upon the Greathead system the same as was used in the St. Clair tunnel on the Grand Trunk (see Railroad Gazette, Sept. 26, 1890), and on the City & Southwark tunnel, London, This system depends chiefly upon forcing a steel shield forward by hydraulic jacks, excavation being madethrough openings in the shield, and upon lining the tunnel behind the shield with cast iron rings in short sections. The work is done under air pressure.

The tunnel will be 6,310 ft. long, and cost \$2,500,000. The internal diameter of each tube, of which there are

conductor of the wreck train where the accident is, number of tracks blocked, and whether or not any empty cars on the Waterloo end, this latter diameter being neces r trucks are required.

The general practice in dealing with wrecks in which that part of the line. The two tubes are 17 ft. 6 in. apart,

varying the thickness of these strips on opposite sides of the tunnel curves are made, although on the sharp curve just mentioned radial segments were necessary. The joint flanges for the various joints form ribs, and the space between them is filled with concrete (see Fig. 3), and the inside of the tunnel made to present a

smooth and even surface.

For the convenience of workmen there will be connecting passages between the two lines of tunnel, six of the kind shown in Fig. 4, placed at regular intervals from Upper Ground street to the City station. Fig. 5 shows an especially designed connection at Broadwall and Stamford streets.

The work is now going on in both tunnels. of the excavation, that for the city end of the tunnel, was done from a staging in the river,  $325 \times 50$  ft., castiron cylinders being sunk to the tunnel level, from which the headings were driven. The work has advanced rapidly, as much as 10 ft. of tunnel being sometimes made in 24 hours. As soon as a lining ring is put in place, a grouting of 3 parts of blue lime to one of sand, is injected through holes left in the center of each plate, by means of a compressed air apparatus especially designed for the purpose. Haulage throughout the completed part of the tunnel is done by 18-in. gage electric contractors' locomotives.

The foregoing is abstracted from an account of the tunnel, published in *The Engineer* (London) for July 26 and August 2, 1895.

#### Railroad Construction in the Peruvian Andes.

Mr. James R. Maxwell read before the Engineers' Club of Philadelphia on May 4 a very interesting paper con-cerning the construction of railroad lines in the Peruvian Andes. From the summary in the early part of his paper we learn that the estimated population of Peru is about 3,000,000; that it is about 450 miles wide, east and west, at the widest part, and 1,000 miles long, north and south, with an area of 12,000 sq. miles. About 70 per cent. of the population are Indians, 20 per cent. mixed and the rest whites, mostly Spanish or of Spanish descent. Although the country was well equipped with narrow mountain roads in the times of the Incas, these have largely fallen into disuse, and the only good roads in the country are near Lima and Callao, there being a the rails at each end, and also braced by screw jacks tunnels at times, owing to the character of the soil good wagon road between these two cities and some

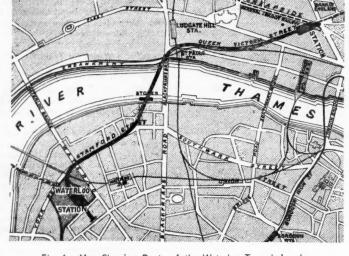


Fig. 1.—Map Showing Route of the Waterloo Tunnel, London.

or trucks are required.

the cars are badly broken up is to approach the wreck c. to c., horizontally, except at Cross street, where it was with derrick ahead of the engine. The derrick is held in place by clamps attached to the body of the car and to in Fig. 2. It was also necessary to vary the levels of the

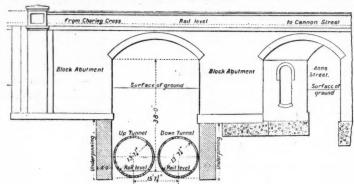


Fig. 2.-Tunnels Under the South Eastern Railway near Waterloo

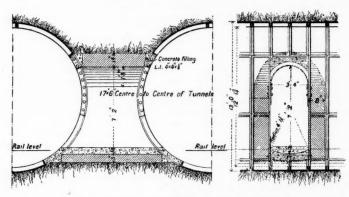


Fig. 4.—Details of Cross Passage Between Tunnels.

The engine is then used to pull the wrecked cars out. As the main tracks are to be cleared as quickly as possible, no special effort is made to save the lading or the cars. If the accident happens on a fill, the wreck is thrown down the bank, and if in a cut it is either dragged out or broken up.

Using the derrick as above described does away with a great deal of the use of hydraulic jacks. In case the trucks are knocked out from under the body of a car, by hooking one end of the wire rope into the drawbar or end of a car, then, by raising the body of the car sufficiently high the truck can be run under it without much trouble. After the main tracks are sufficiently cleared to allow the traffic to be resumed, the wrecked cars are picked up and brought in.

If the crew is thoroughly drilled and each man has certain assigned duties to perform, understanding them thoroughly, a bad-looking wreck will be cleared up in a very short time. But if you have a crew in which there are ten men holding torches watching two other men working a jack, a small wreck is a tormidable affair.

Engine? Engineman? Conductor?
Place and time of accident?
What caused it?
What caused it?
Where any persons injured, and to what extent?
Which track is obstructed?
Which track clear?
What crossing switches east and west of obstruction can used to pass trains around?
Which track can be open first, and how soon?
Is track much damaged?
How much force is wanted to clear obstruction? Will ervisor's force be sufficient?
Is engine off track or damaged? What position is ine in?

supervisor's force be sufficient?

10. Is engine off track or damaged? What position is engine in?

11. Number and kind of cars on train?

12. How many cars broken and off track, loaded? Empty?

13. How many car trucks are needed?

14. What does lading of cars consist of? What amount of damage to lading?

15. How many cars, and kind, are wanted to transfer freight in?

16. How many cars have you next engine?

17. How many behind cars wrecked?

18. What east-bound trains are stopped by obstructions?

sisting of seven segments, and a key piece at the top.
The longitudinal joints are planed and are radial to the

placed under the side of the derrick directly opposite the crane. A wire rope 1½ in. in diameter, one end of which is coupled to the engine and the other end passed through the crane in the derrick, is attached to a broken car. The engine is then used to pull the wrecked cars out.

He countered (see Fig. 5). The steepest grade against the load throughout the line is 88 ft. per mile. There is in means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. There was no means of communicating with the interior of the country thereabouts. sengers only and was very profitable, being atterv sold for \$800,000 to an English company, which cap company, which capitalcenter of the tunnel, except in the case of the key | ized it at \$500,000 and paid a six per cent. dividend on the

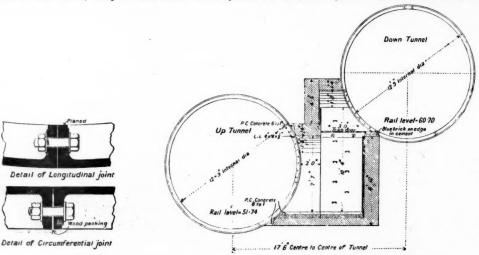


Fig. 5.-Connection between Tunnels, Stamford Street.

pieces, the sides of which are left vertical to render insertion easy. The arrangement of the joints is shown in line eight miles long from Lima to Chorillos, a summer Fig. 3. Both the segments and the separate rings are Fig. 3. Both the segments and the separate rings are joined by turned bolts 1 in. in diameter. There is no packing between the segments of each ring, but each joined by turned bolts 1 in. in diameter. There is no packing between the segments of each ring, but each ring is separated from the adjoining ones by strips of creosoted wood (see Fig. 3) from % to ½ in. thick. By

Fig. 3.-Sections of Joints.

come of this the Government, late in the sixties, easily floated a loan in England and organized a system of public works, which included a number of roads, some of which were projected across the Andes for the purpose of reaching certain productive localities. The topography of the country makes it a difficult one for railroad construction. A survey made to ascertain the expense of extening the railroad from Molindo to Islay, six miles along the coast, showed that a railroad would cost \$1,500,000. The country is very mountainous, the valleys being deep chasms, generally very steep and narrow. This is on the western side of the Andes. On the eastern side the descent is much easier, the valleys being generally wider and falling more slowly. The heights of the intervening ridges, however, is such as to render a north or south connection impracticable on account of the cest of building and operating.

The Board of Public Works, composed of engineers of

foreign education, fixed the standards for the n

financial difficulties of the Peruvian Government. Work was resumed in May, 1890, and the road was extended to Oroya, this section being the most difficult and important part of the line. So difficult was it to work in the high altitudes that the riveters did not average a week's work each, being forced to stop on ac-count of the rarified atmosphere. Many of them started back on the next train. The famous Verrugas built by Mr. L. L. Buck, is on this line to Oroya. The famous Verrugas viaduct,

#### Proposed M. C. B. Standards for Handholds

The Executive Committee of the Master Car Builders Association, adopting the views of the Committee of eleven, believes that in the future construction of cars the application of grabirons or handholds should, for the greater protection of trainmen, go somewhat beyond the present recommended practice of the association and the requirements of the law, and recommends that cars of

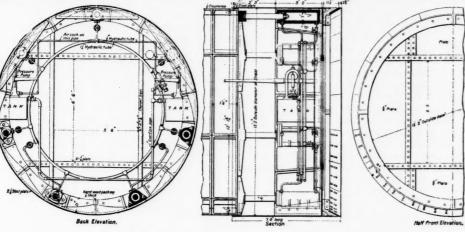


Fig. 6.-Elevation and Sections of the Greathead Shield

and under these fixed conditions left all details to the contractors' engineers, subject to the approval of the Government inspecting engineer of the district, who also approved each monthly estimate. The maximum grade was fixed at 4 per cent. and at 3 per cent. on curves of 120 meters, which was the minimum radius allowed. Compensation was not required on curves of 600 meters or more. The minimum length of tangents between curves turning in opposite directions was made 30 meters The standard roadbed was 14 ft. wide with cuts 16 ft. wide at sub-grade, all through bridges to be not less than 14 ft. in the clear and tunnels 18 ft. high inside. The gage of most of the roads was 4 ft.  $8\frac{1}{2}$  in. One road however, was built with a gage of 3 ft. 6 in. and another with a gage of one meter. In 1872 contracts for \$100,000, with a gage of one meter. In 1612 contracts for 2100,000, 000 worth of road were under way, all of these contracts being let to Mr. Henry Meigs. The 3 ft. 6 in. gage spoken of was on the eastern side of the mountains at Cerro de Pasco, and all the material for it, including even the locomotives and freight cars, was carried piece-meal over the mountains by mules. The pieces had a maximum weight of 270 lbs., and the rails were in 6-ft. lengths, each length weighing 90 lbs. The road of one meter gage was 165 miles long from Chimbote, up the valley of the Rio Santa, to Recquay. It is not yet finished, but will be one of the best paying roads in Peru when done. The maximum grade is 2 per cent. The great difficulties in its construction have prevented its early completion. In one portion of the road there are five tunnels in less than a mile, and in some places the railroad men were the first persons who had ever tra-versed the country through which the line runs. The cost of this road was very great; it was more expensive to make the preliminary mule trail per mile than to grade a railroad in ordinary country. Track was laid on about 67 miles, a large part of which was badly broken by high freshets in 1884. Only about one half of it is now in operation.

The southern system of roads in Peru consists of 107 miles of line from Mollendo to Arequipa, 218 miles from here to Puno, and 210 miles of line projected from Juliaca to Cuzco, of which latter only 112 miles is finished. The first road is level for 9 miles and then rises 22 ft. in 4 miles and over 3,200 ft. in the next 20 miles. As there was no water for the first 76 miles of the line it was hauled in tanks, and during construction this alone cost over half a million dollars. A pipe line 84 miles long now furnishes water for the lower part of the line and for the port of Mollendo. The difference of elevation in its ends is 6,000 ft. On the road to Puno the altitude of one point is 14,666 ft. above sea level. The road to Cuzco branches off from the Puno line at Juliaca, 29 miles from Puno. It crosses the summit of the eastern range at an elevation of 14,240 ft. The lowest elevation of this line when finished will be 10,050 ft. above tide.

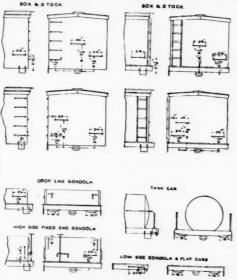
The most celebrated of all the roads is the Central Rail-road of Peru. It starts at Callao and keeps rising until it reaches an elevation of 15,666 ft., about the height of Mount Blanc. It extends to Oroya, and when completed it will reach the navigable waters of the Amazon. The difficulties encountered in building this road were en-ormous. In one place there were 57 tunnels in a dis-tance of 24 miles. On the western side of the mountains the maximum grade extends for 60 miles. Work began in 1870 and was stopped in 1875 owing to the

different classes shown in the accompanying cuts should be equipped with the arrangement there shown.

The principal changes from the present recommended practice are first, the addition of one handhold higher up on the and of each car near the middle of the end on cars of certain classes and where a ladder round is not available for such use, for men to hold on to when it is necessary to get upon the end sill or deadwood; second, the location of handholds on certain gondola cars above the endsill instead of on the endsill, so as to be more like the location on box cars; third, the location of grabirons or handholds on end sills of flat or gondola cars upon the under side of the sill, instead of the tlsewhere, as might be permitted by the present recommended practice:

The Executive Committee has submitted to the mem proposition for an informal ballot, with the re 653 votes for and 320 against.

This ballot will have no status in the standards or



Proposed Standards for Handholds.

Note,—All grabinos or handholds should be secur 16 in. through bolts riveled over the nuts, except where possible to put a lag screw in solid wood, in which cas lag screw must not be less than 1/2 in. diameter and 3 in. It was thought best to show the height of handholds the center line of drawbar instead of above the under sthe framing as heretofore, because the latter is an indepoint.

mmended practice of the association, but will be useful guide to members in applying handholds or grabirons prior to the convention of 1896, because it will inwhat may possibly then be adopted by the As tion.

# The Kleman Nut Lock.

The Allison Manufacturing Company, of Philadelphia is now making a nut lock, for which a number of advantages are claimed. The lock is shown in the accompanying engraving, which indicates its operation clearly.

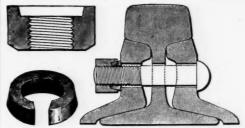
The device is simple, and consists of a countersunk cavity on the inner face of the nut as shown. An oil tempered, tapering washer, shown in the engraving, is put on the bolt against the bearing and then the nut is screwed home, the spring washer fitting in the cavity and being compressed by the nut. It thus acts to lock the nut, as will be readily seen by reference to the engravings. The nut itself does not bear against the bearings or plate applied, as the outer face of the washer does not extend to the base of the cavity. In the nut, space is allowed for expansion and contraction of the bolt

This lock has been tested during a period covering five years on railroads, drop presses, steam hammers, etc., and has given very satisfactory results, judging from the many testimonials brought to our notice. Among these testimonial are those from a number of well known steam and street railroads.

#### The Present Use of Wooden Bridges.

Mr. J. Parker Snow, of the Boston Society of Civil Engineers, has a paper in the June issue of the Journal of the Association of Engineering Societies, concerning the use of wooden bridges on the Boston & Maine Railroad, which will perhaps surprise some persons who imagine that wooden bridges for railroad work are practically obsolete.

Mr. Snow tells us that there are 1,085 wooden bridges on the lines operated by the Boston & Maine out of a This includes overhead crossing bridges, total of 1,561. and everything of 6 ft. clear opening, or more, except stone box culverts. While the number of wooden stone box culverts. While the number of wooden bridges is reduced each year, yet more than half of the new bridges built to replace old ones are of wood. Of course the fact that timber is cheap and readily obtaincourse the fact that timber is cheap and readily obtainable is the principal reason for this, although the wooden bridges possess some advantages other than their cheapness. At the present prices it is found that there is practically no difference in cost between Howe trusses of Southern pine and iron bridges, when of considerable span. The costs of single-track bridges of 120-ft. span compare about as follows: Iron, \$5,300; Howe truss, Southern pine with iron angle blocks, \$5,000;



The Kleman Nut Lock.

spruce lattice, \$3,500. In shorter spans the wooden ridges are much more economical, in longer ones, rap

The difficulty of obtaining the cheaper spruce in sufficient lengths, prevents its use in Howe trusses of any size, and even for bottom chords of lattice bridges of 100 ft. span or over. Sawed spruce lasts but six or seven years when exposed to the weather, although when properly covered, ventilated and kept free from accumulated dirt it will last from 40 to 50 years. Tamarack is used for piles in dry land and lasts 8 to 10 years, while chestnut and oak give good service for from 15 to 20 years.

Wooden bridges are not designed for the heaviest loads. A train of consolidation engines, weighing each, with tender, 172,000 lbs., and having 24,000 lbs. on each driving axle, or 80,000 on two axles, 7 ft. apart, is the usual standard. This is in excess of the engines now in use on the Boston & Maine, and should rolling stock increase greatly in weight, the wooden bridges may be easily strengthened or cheaply replaced.

For spans between 30 and 60 ft., pony trusses of the Howe type are generally used, and for overhead highway bridges almost entirely. For spans greater than is desirable for pony trusses, the Town lattice, built mostly of spruce, is used. The presence of the spruce thus determines the type of bridge built, since, as we have said, it is a sympatty suited to lattice, and not at all have said, it is eminently suited to lattice, and not at all

The life of some of these bridges is remarkable. One taken down last year and replaced by a similar structure had been in service over 50 years, and another, replaced the year before, 45 years. To indicate the abuse they will stand in service, Mr. Snow cites a case in which a butting collision on the approach to a bridge piled the cars of one train up through the roof without seriously damaging the bridge. A case is also mentioned in which a pier was washed out from under a two-span bridge, which did not fall, since it is the invariable practice to make such bridges continuous over all interme-diate supports. Again, the abutment was washed out under the end of a bridge, causing one of the trusses to settle several feet, in spite of which its flexibility al-lowed it to be blocked up into place and readily re-

The paper does not advocate the building of wooden bridges instead of iron ones as a general thing, but shows how, in some localities, it may be cheaper and better to use wooden bridges, even though they will without doubt all be replaced by metal structures ulti-



Published Every Friday

#### EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisement.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

In Great Britain the wheel gage question about which there is so much dispute and discussion her a very simple one. There is no need of a painful discussion of allowances; they make the car axles so stiff that they do not spring and alter the gage when the load is on the car and then insist that there be no variation in the thickness of the flanges when the wheels are made and no variation in the location the wheels on the axles; that is no varation that can be detected by the average mechanic.\* It is not thought to require any superior intelligence to make wheel flanges practically of the same thickness and it is considered no trick to put wheels in the proper place on Hence why should there be any such variation as to cause the serious consideration by officers of the widest possible allowances? This is the question which the British master mechanic asks himself, and finding no reason to the contrary he issues orders to make the wheels alike and put them on the different axles in the same lateral positions. The result is no variation that is of the least importance in interchange, and all wheels that will not receive the gage that fits over the flanges, inside and out, are promptly refused. The axles for the same load are fully twice as stiff as those used here. Here the case is different; some roads inspect wheels when sent from the foundry, others do Hence all s rts of flanges get into service. Some shops put wheels on the axles in a careless way, and are satisfied so long as the spacing falls within the wide limits allowed by the M. C. B. standards This is a slip-shod practice as the standards of limits are not primarily intended for new work but for the acceptance of bad work at interchange points. The axles here are so flexible that they bend enough to spread the wheel flanges on the track and bring them in on the top far more than the maximum allow ance for all variations permitted by European gages for wheels. So much is the bending that the M. C. B. Association this year fixed the measuring point at the center of the vertical height of the wheel where the bending has little effect. Much of the prevailing trouble arises from carclessness in putting on wheels and lack of inspection, and the decision of the American Railway Association Committee when it fully understands the fundamental causes of the variations in wheel gages here will be read with interest. One member of the Association made a special investigation of this subject while at the Interational Railway Congress this year and perhaps he will be able to instruct his colleagues in possible prac-

## The Northern Pacific and the Great Northern.

Among all the railroad reorganizations effected in recent years, or still pending, none seems quite so interesting and important as that of the Northern Pacific. The stress of the hard times has developed the weaknesses in the internal conditions of many great railroad properties (and little ones, too), and brought

changes of tremendous importance, not to those railroads alone, but to the nation. The bankruptcies, the receiverships, the foreclosures and the reorganizations have been painful and costly; but they are leading toward sounder conditions, wiser management, and to the ultimate good of the properties and of the people whom they serve. In some cases fixed charges, grown beyond the earning power of the roads, will be reduced; in some cases corrupt or inefficient managements will give place to abler or honester men; in some cases onerous contracts, inherited from former managements will be annulled or modified, in some weak lines, unable ever again to stand alone, will be joined in a strong system. There are especially unfortunate cases where all or nearly all these changes must be made at once. Some mistakes will be made, to be followed by further losses to the security holders and other reorganizations; but it is reasonable to believe that the liquidation of this period will leave the mass of the railroads far sounder than they have been for years--- some of them sounder than they ever

Among all the great schemes of reorganization none other presents such important political and social questions as the plan to put the Northern Pacific under the control of the Great Northern. In other reorganizations the only question has been the result to the owners of the property. The communities along the lines have had only a secondary interest in the event. They have been quite indifferent as to whether or not the owners got any interest on the investment, and they have not realized that they would themselves be better served by a solvent railroad than by a bankrupt one, for bankruptcy has seldom lasted long enough for track, equipment and service to run down so far that the people served have realized the difference. They have been fairly served and do not know how much better or worse off they might have been.

The fear that competition would be destroyed has seldom been aroused by the recent reorganizations, for they have not involved new combinations. The concentration of interests which resulted in the Southern Railway has disturbed some people in the territory served; they have foreseen losses to local interests through lessened competition, reduced train service and concentration of shops. But these alarms were not great or wide spread and we very seldom now see any expression of them. There is reason to believe that the great mass of the solid people, those who really have a stake in the community, realize that they are in a way to get better service from a strong consolidation than from a group of feeble but independent lines.

With the Great Northern and the Northern Pacific the conditions are very different from those which have existed in any of the recent reorganizations; indeed no such conditions have ever been met before in any of the many changes in railroad ownership and control that have taken place in our history. Here are two parallel lines from St. Paul and from the head of Lake Superior to the Pacific Ocean. They cover over 30 degrees of longitude, or about three-fifths of the distance from New York to tide-water on Puget Sound. From St. Paul to Seattle by the Great Northern is 1,827 miles; from St. Paul to Tacoma by the Northern Pacific is 1,912 miles. The two lines command the best transcontinental zone in the United They are seldom more than 100 miles apart, touch at several points, and by their branches cover effectually the belt between the lines and at considerable distance north and south. They compete actively at their termini and at several important intermediate points. Their territory is inhabited by a most energetic and ambitious population, and has greater natural advantages than any other part of the country west of the Mississippi River. Now it is proposed to put these two railroads under one control and that control very strict and absolute, vested in fact in one strong man. No proposition of this nature and magnitude has been made before since railroad companies began that progress toward consolidation which seems as inevitable as the processes of nature. After all the talk about the power of corporations and the abuses of monopoly, after all the legislation to restrain corporate power and to secure competition here is quietly produced a proposition to make a monopoly of the transportation business of a vast area and of a part of our population second to none in enterprise. No wonder that the Northwest is ablaze with indignation-or at least that a hundred newspaper offices are ablaze, for the people are said to be taking the matter very quietly.

It seems probable that much of the feeling against the plan comes from a misapprehension of its origin and purpose. The natural theory is that the Great Northern people wish to take advantage of the Northern Pacific's embarrassments to get control of a rival and to secure a monopoly of the great territory of the two systems. We have been told definitely, and by the

best authority, that the proposition to put the Great Northern in control of the Northern Pacific did not come from the Great Northern, but from the Northein Pacific; that it was first made by the representatives of a majority of the securities of the Northern Pacific; that Mr. Hill was at first reluctant to consider the matter at all, and that the plan was urged upon him by men to whom the prosperity of the Northern Pacific is of great importance, both in money and in reputation. To those men an alliance of the two roads seems necessary to the prosperity of the Northern Pacific and to the ultimate redemption of its securities; and of course if this alliance is made the Great Northern will control, because it is in a position to dictate the terms of the bargain. Indeed, the first condition laid down by Mr. Hill was that he must control the majority of the stock. Without this he will not enter into the alliance, for to make it successful he must have actual and enduring control-not nominal or incidental control. But this one condition is in itself so formidable that it alone may defeat the whole project.

In this negotiation the Great Northern occupies a position of remarkable strength. Its total debt is less than \$28,000 a mile; it has no floating debt; it has much the best grades of any of the transcontinental roads (see Railroad Gazette, June 30, 1893, for comprative profiles of five roads); it has been worked from the first with the constant purpose of making net earnings, and its rolling equipment, yards, sidings and terminals are all highly efficient. The controlling idea is always to reduce the cost per unit of traffic, and not merely to show a great gross tonnage. In short, it has been designed and worked as a revenue-earning machine, not primarily as an enterprise for the enrichment of a few.

The Northern Pacific has a much greater debt per mile, how great the recent changes make it hard to say; its profile is better than those of any of the transcontinental roads to the south of it, but not as favorable as that of the Great Northern. For various reasons, for which the present management is not responsible, it cannot do work as cheaply as its greatest competitor. It is true that recently a good deal of money has been spent, according to sound principles, in raising the efficiency of the road as a transportation machine, but it is still at a disadvantage. Thus we see that it is not nearly so important to the Great Northern as to the Northern Pacific that competition should be abated. If we had any reason to doubt that the plan of an alliance originated with the Northern Pacific (which we do not), the facts of the situation indicate that it ought to have originated there.

The alliance, as we have said, must mean the absolute control by the Great Northern of the rates, traffic working and general policy of the Northern Pacific. If such control could be brought about, would it be for the interest of the properties? Would it be for the interest of the public? Would it be for the interest of the other Northwestern and transcontinental railroads? It is easy to see that the properties would profit by rates adjusted on a sound commercial basis and well maintained, and by the reduction of duplicate train and terminal expenses. Duplication of existing lines would also be aved. The Northern Pacific might lose by diversion of traffic, but one of the conditions of the settlement is a guarantee of a fixed minimum of net earnings. It is sound doctrine that the public served would gain also by rational rates, stable and maintained, and would share in the pro-perity that would come to the roads from the economies possible under the alliance. There might be some reduction of train service to some of the communities: but it is probable that commercial considerations would produce adequate service as well as reasonable rates. Finally, it might be expected that the other railroads would be the better off for the removal of a powerful element in rate disturbance

But back of all this are the social and political considerations which make the case so peculiar and so important. The people dread monopolies and dread the growth of corporate power. Probably this feeling is a good deal stronger in the West than in the East, but it must be reckoned with in both sections. A juster sense of the uses of corporations and of their rights and proper limitations seems to be growing up, especially toward the railroads. There are in the Northwest very sagacious railroad men, who know their country well, who think that if this plan is carried out it will alarm and exasperate the people, and will provoke a storm of hostile legislation. They believe that it will put back for years the development of that juster sense of which we have spoken. And these are not timid men, either, to be frightened by a populist scarecrow. On the other hand, the Great Northern people who also know their country well do not believe that the newspaper outcry which has been raised

in opposition to the plan is the voice of the people. They believe that the mass of the patrons of the roads will approve of the change, which will facilitate the development of a sound policy of building up the tributary country.

Thus we have outlined some of the features of a project which seems to us the most interesting of the great railroad changes of recent years. We venture no opinion as to the chances of its being carried through.

#### Brakes for Electric Trains.

With the use of electric locomotives on trains of three or more cars, run at considerable speed, has come a problem in brakes that must receive immediate at tention—the design of the air pump. The brake mechanism is divided into two distinct parts, the air pump and the devices to control the air after it is stored. The Westinghouse quick action automatic brake is as well adapted for this class of work as for any other, but with it, as with all compressed-air brakes, the air must be pumped into reservoirs. The vacuum brake cannot be used with electric locomotives, as there is no steam to use in the ejectors and it is not practical to pump a vacuum for this work. The electric brake is still ahead of us and all such devices now offered are experimental for more than one car. As it stands to-day the only developed brake for electric cars is the compressed air brake, and with it has come the problem of the electric pump and governor

On the Nantasket Beach and the Mount Holley ele tric roads, where the automatic compressed-air brake is used, there has been much trouble with the air pumps and governors. They have been noisy and unreliable, but recent changes make them promise better. and it may be expected that there will soon be a suitable electric air pump. Several are now offered in the market, and the Westinghouse Air Brake Company is bringing out one on a new plan.

With the electric brake the power is at hand, but the devices to use it are crude and troublesome. No doubt, all roads using the compressed-air automatic brake will prefer to continue it when changing to electric power, for the reason that the cars will not have to b changed, and further, because the devices used with that brake are practical and well understand. So far all new elevated roads but one, and all surface steam roads, have taken the automatic air-brake in making a change to electric power. The single exception is the Metropolitan Elevated of Chicago. Much to the sur-prise of engineers generally, this road started with an undeveloped and experimental non-antomatic brake, and with the intention of ruuning six cars on the fastest time and shortest headway ever accomplished on ar elevated road. The constructors of the road even ridiculed the use of the automatic brake on the Alley elevated. For this reason, as well as because of the wish to see a safe device used for public conveyances the selection of the automatic brake for the Lake Street and the Northwestern elevated roads of Chicago ple those who had a part in fixing upon that device for the Alley elevated

The new and almost untried device on the Metropolitan, which has been used before only on the Intramural road at the World's Fair, has more parts and is more complicated than an automatic brake, one feature being two distinct and separate brake cylinders to do the work done heretofore by one cylinder in all common forms of both automatic and non automatic As a result, the Metropolitan has had much trouble. The brake has had no suitable governor and therefore the pressure of the shoes against the wheels has been dependant upon the diligence of the motormen. For this reason there have been many slidflat wheels and an occasional collision with a bumping post. The officers of the road will try an electric brake as soon as some experiments that are in progress are completed; but this is somewhat doubtful, as satisfactory electric brake for five and six-car trains is not being offered in the market now and there is little promise that there will be one soon.

In taking on a new kind of motive power there is

developed an experimental spirit which often leads to incidental troubles that are, perhaps, more annoying than the unforseen difficulties arising directly from the fundamental change of power. For good reasons of this sort it is well to let the experiments with brake apparatus hold over for the coming engineers who are now in school. There are some indications that both electrical and mechanical engineers will find enough hard work to wear themselves out on in connecti with a change of motive power, and they will find life easier if they do not fool with the intricacies of the air-

The inquest on the fall of the Ireland Building in

Parker; an ex-inspector, E. J. Youdale, and three foremen were held responsible by the coroner's jury for the accident, and the jury found as the cause insufficient foundation under the third column from the West Third This foundation was less than the thick street front. street front. This foundation was less than the thick-ness prescribed by law and was further weakened by standing partially over a cistern that had been filled with loose material. No evidence was brought out indi-cating that the floors of the building were overloaded, or that the defects which existed in the iron work were in any way contributory to the collapse. Many p in the construction of the building are open to criti Many points Of course it was inexcusable in the architect not to know the ground on which he was building, and this alone will ruin him professionally. The use of fragile stone for the stone, the thin concrete under this, the wretched work in the grouting under the capstone, the fact that the work was done in freezing weather, all astounding incapacity for such responsibilities. It was found that the columns were of varying thicknesses, that the beam brackets were weak and of poor design, that throughout the work, bolts were used that were too long or too short, or that the bolt holes were too large, and even that, in many eases, the bolts were altogether omitted. That the real reason for the accident was in the found. bolts were altogether omitted. That the real reason for the accident was in the foundation is apparent from the expert testimony of Mr. Brinckerhoff and Mr. Van Horne. Mr. Van Horne said in testifying: "My opinion as to the cause of the collapse of the building is failure of the foundations, the latter being deficient. The cistern also was a contributing factor to the accident. I also examined the roof of the building and discovered that it was a foot lower in the center than it was north and south." He further said that in his opinion the broken column was strong enough in itself to bear the weight resting on it. Regarding the foundations, he found them insufficient in every particular, their bearing capacity being about 1½ tons to the square foot, while the central column was actually carrying from 2½ to 2¾ tons at the time of the accident.

Mr. C. C. Brown, C. E., testified that he had examined the columns in the building a number of times and had found no rotten iron. The blow hole area in the sunken column was 2.79 sq. in., leaving about 16 sq. in. of solid metal, capable of supporting about 100 tons. The col umns were obviously not first class, but the foundations were relatively so much weaker that the strength of the columns was never taxed

A peculiar and very bad accident happened last Monday afternoon on the Sea Beach Railroad, which runs from Bay Ridge to Coney Island. An assisting engine which had pushed a passenger train of 17 cars out on the road was returning (backing) to the station. A car which was being switched to make up another train was discovered on the track, and at about the same time the spring of the throttle latch fell out, the throttle was unlatched and opened, admitting full steam. The engineman threw the reverse lever to forward motion, but was unable to prevent a collision which wrecked the cab and bent the throttle stem so that the throttle could not be closed and the engine started back on the track in pursuit of the train which it had helped out. At least se are the facts as given by the Superintendent of the road. The result was that the engine running wild overtook the train, making a bad tail-end collision. One passenger is dead at the time of writing and some 45 injured, most of them not very seriously. Investigations of the accident will be made by a coro and by the State Railroad Commissioners, and course, by the officers of the railroad, and until the evidence is collected any further comment on the accident would be premature. Some of the newspapers are saying that the cars were of very filmsy construction and that a great many passengers were injured who would have been uninjured had day coaches of the usual strength been in use. It is altogether probable that if the last cars of this train had been Pullman cars there would have been little injury to the passengers, but it could hardly be considered good practice to run Pullman cars in service of this sort. In fact a good many railroad officers hold that for suburban service the equipment ordinarily used is entirely too heavy; that economy and require a special class of light equipment for this service. This question is a theoretical one which has two sides and which can be indefinitely argued. The ideal practice would be to use light equipment and to absolutely pre vent collisions. A peculiarity of this account is that there are neither telegraph nor telephone connections to the way stations between Coney Island and Bay Ridge. Consequently, no warning could be sent to the passenger train. The Superintendent says that it would have been impossible to derail the engine even had there been such warning, as the switch points were all trailing in the direction in which the engine was running. It does not seem impossible, however, that the engine could have been derailed by putting something on the track. It might also have been possible to stop the passenger train and get the people out of it. Of that, however, we cannot judge until more facts are known.

The article on time-tables which appears in another column of this issue contains a number of bits of advice that are as applicable to posters as to folders. that most of the good ideas here presented are already in use in your time-tables, or that all of them have been used at some time on your road should not be allowed to New York City closed last week. Six persons, namely, the architect, C. R. Behrens; the contractor, J. H. ought to be studied by all young helpers who have a

hand in getting up tables. These features of a time table, features which we are apt to class as minor, are too often left to the clerk to attend. If general passenger agents more fully realized that of 20,000 folders sent out probably 5,000 are not only read but studied by intellipassengers, probably more G. P. A.'s would give onal attention to the minutiæ of their make-up. All the good features not inconsistent with each other should appear in all time-tables. There is much injudicious condensation merely to save a little paper. Later a larger sheet is adopted, but the old abbreviated forms are retained, through carlessness. There is one important element in the issuance of posters which does not apply to folders and which the article referred to does not touch upon; we mean the systematic record. at each station and ticket office, of all the posters sent out and of the places to which they are sent. Posters are valuable to the public, even where folders and news paper advertisements are liberally provided, for the coarser type and uniformity of style, coupled with the complete absence of abridgements make the poster much easier to study than other tables. But the pre-eminent advantage of the poster, that it is official and up to date, is often lacking or is a matter of doubt, and up to date, is often lacking or is a matter of doubt, and the record we speak of is the rational means of correcting this drawback in using posters. The passenger wishes to know not only that he is reading the official table, but that it is, or will be, renewed promptly when occasion requires. New issues or notices announcing changes should be issued a regular number of days before a change and be sent to every person who received the last time-table; and no should be given out, except to places of record. which will be supplied by a messenger when a change is to be announced. If posters are given out otherwise they discredit all the posters of the road, for no one can ever tell whether the one that he is reading is up to date or not.

#### NEW PUBLICATIONS.

Poor's Manual of Railroads. H. V. & H. W. Poor, 44 Broad street, New York City. Price \$7.50.

The 28th annual number of this indispensable hand-book has just been issued. The value of this work to everyone interested in the railroads of America is well known, we presume, to most of our readers. It has no competitor, and yet the accuracy of the work done upon it and the constant evidence of the painstaking care with which the editor has made up every page, are as prominent as in publications which have the constant stimulus of one or more rivals in the field. Copious ex-tracts from the summaries printed in the front part of the book were given in the Railroad Gazette last week. The Manual now contains 1,412 pages, without the list of railroad officials, which is printed separately. The number of statements of railroad companies this year is 1,900, occupying 1,019 pages. In the supplementary matter, received after the main portion of the book was printed, statements of many important railroads are given up to June 30, 1895. In a circular issued by the publishers there is a brief statement of the amount of work required to compile the tables summarizing the statistics of the whole country. These statistics are made up from the reports of 827 companies, and the tabulations require 64,468 items to be recorded, compared and checked; and after this is done 18,525 columns

of figures have to be added up.

The manner of preparing the individual statements has been gradually changed from year to year, so as to condense them more, so that now the matter occupying ages would, if printed in the style of earlier years. fill 2,500 pages.

The street railroad department now fills 113 pages, and the number of corporations, cities, counties, etc., reported upon is 1,581.

volution of the Air-Brake. By Paul Synnestvedt New York: Locomotive Engineering, 256 Broadway 1895. Price \$1.

This small volume is a reprint, with revision, correction and addition, of articles published about two years ago in Railway Engineering and Mechanics. The book gives briefly, but in considerable detail and with numerous illustrations, the story of the evolution of the airbrake in general, and of its parts. It tells something of pretty nearly all the power brakes; but, naturally, the greater part of the volume is taken up with the compressed air-brake and its necessary adjuncts, such as couplings, pumps, governors and valves. There is a good deal of information which has now passed into the domain of that which is curious and hardly useful, but there is a good deal more that is of actual present value to those who are interested in this subject. On the whole, the book is one which was well worth making.

Proceedings of the Master Car Builders' Association, 1895. John W. Cloud, Secretary, Chicago.

The reports of this year's annual meeting, held at Alexandria Bay in June, are now issued in complete and convenient form and they come to us in a handsome cloth binding. The subjects and committees for next year appear prominently in the opening pages. The general character of the contents of these reports is already understood by our readers from the accounts presented by us at the time of the convention. The standard drawings, on folding sheets in the latter part of the book, are very conveniently arranged,

#### TRADE CATALOGUES

The Brown & Sharpe Manufacturing Co. Machine tools. Providence, R. I. 1895.

The catalogue of this company for 1895 is, as usual, a compact, well arranged book of convenient size  $(3\frac{1}{2}\times$ 5% in.). Pages 1 to 164 are devoted to machine tools of all 5% in.). Pages 1 to 164 are devoted to machine tools of an kinds, and pages 165 to 366 to small tools. The 1895 edition has been revised and enlarged, so as to contain 60 more pages than that of last year. There are many tools not heretofore described. A large number of new tables have been added, and such changes have been made that the new edition of the catalogue should replace all former editions

The Hawley Down-Draft Furnace.—The Hawley Down-Draft Furnace Company, Security Building, Chicago, issues a remarkably well-illustrated catalogue of 112 pages, with a table of contents and list of illustra-There are engravings showing the application of the Hawley down-draft furnace to various types of boilers and results of tests made on boilers thus equipped. There are also numerous photo-engravings of the various factories and buildings using this furnace. A table of the heating power of American coals is given, together with a code of rules for boiler testing and useful informa

Car Heaters. William C. Baker, 143 Liberty street, New York, 1895.

In a well-arranged catalogue of 95 pages Mr. Wm. C. Baker illustrates the various types of car heaters which he makes. The numerous parts of heaters are illustrated, and the catalogue contains some heating devices of im-proved design for which much is claimed. In addition to the duties of the pamphlet as a catalogue, it contains a considerable amount of general information on the car-heating problem. Mr. Baker makes stoves for street car heating as well as for railroad cars.

Concerning Babbitt or Anti-Friction Metals. The National Lead Co., 1895.

This little pamphlet deals with the subject of anti-fric tion metals for bearings, etc., and describes the various grades of alloys made by the National Lead Co. for different kinds of work. Varying quality of alloys, designed for different uses and for light or heavy grade work, are described.

#### Time Tables and Folders.

BY J. MCD. STAFFORD.

Of the various products of the advertising department of a railroad, the time tables for public use are the most important. If there could be but one publication, it would be the general folder. This has become a necessity. It goes to every village, town and city in the country, and is consulted frequently by ticket agents, and too much time cannot be spent in bringing it as near perfec tion as possible. The utility of the folder is in proportion to its simplicity and completeness. It goes into the hands of those who know absolutely nothing of the road. its territory or its train service. The compiler is apt to infer, after several years spent in getting out time tables, that every one else should know as much about the road as he does. But there are new men constantly coming into ticket offices of his own and foreign lines, and to these he must be particularly careful to address himself. They are the coming men. The compiler should question every sentence in the folder, and ask himself: "Is this every sentence in the folder, and ask nimself: "Is this plain?" It has been said that where train service is equal between competitive points, the road issuing the best folder and having the best ticket representation, will get the largest share of the business from foreign lines' agen-It is surprising the careless way public time tables are got up by important railroads. A folder is an adver-tisement, and when a passenger is undecided which road he will patronize to reach his destination, the attractiveness and general excellence of a folder have often been known to be the determining factor. The time tables in a folder should be so arranged, and the equipment of each train so fully stated that a person wholly ignorant of the road can by an ordinary effort find what he is

is generally conceded that the book form of folder is an improvement over the primitive extension or "accordeon" style, whose only virtues are that on one side there is enough room for a township map of the world; and that they are useful when wrapping paper be-comes scarce. The funny man, too, has found much food for wit in its stubborn refusal to close up after it has once been opened. The book folder remains intact the longest and while the first cost is a little more than for the extension folder, its life is longer and less are required to supply a given territory.

The General Folder should embody matter arranged

about as follows:

Officers and representatives. Jeneral index.

ieneral index.
ndex to stations.
shrough time tables.
brough car arrangements.
suburban time tables (main line).
coal time tables (branch lines).
nformation for passengers.
nformation for agents.
unction points and connections.
sleeping car rates.

In the index to stations, let the coupon stations be shown in CAPITALS, the non-coupon stations in ordinary type and the prepaid stations in italics, with an stations indented and printed in light-faced or lower case

explanation to this effect at the beginning. In the "Through Time Tables," it is often a question whether, at the larger stations, where it is practicable to show one time only, that time should be the arriving or the leaving time. For instance, train No. 5, on the Burling ton, arrives Omaha 9:50 a. m. and leaves at 10:15 a. m. The agent of an Eastern line selling a ticket to Omaha. rie agent of an Eastern line seiling a ticket to Omana, via Chicago and the Burlington, would like to have the arriving time shown. But how about the case where a ticket is delivered to that line at Omana? For instance, Chicago to Omana, via the C. & N. W.? Then the information wanted is: when does the Burlington leave Omaha, so that the passenger will know what lay over there is? Here the leaving time would be wanted.

In the through time tables, the sign designating whether the train to which it is prefixed is daily or not is better if placed against the time shown opposite each station, and not against the initial station only. Then there is no doubt whether the train in question is daily part of the way and daily except Sunday the remainder. In addition to the regular written description of equipment, the runs of sleepers should be shown by certain letters affixed to the time opposite stations. For example:

		-		-	-	-	-	-		-		
0 181 183	Lv. Chicago-C.,R. I. & P. Ar. Rock Island	*	6:0 11:1 11:1	0	P.	M.	c.	+	10:16	A	. M.	. c.
248 517	Ar. Washington Ar. Kansas City Ly. Kansas City "	*	1.1	0 .	A. A.	M. M.	c.	†	6:48 9:45 7:50 8:40	A.	M.	. с.
740	Ar. Topeka Ar. Wichita Ar. Terral "		1:0 7:0 4:3	7 1	P.	M.	C.		10:40 4:32 2:20	A.	. M.	k.
	Lv. Terral-C., R. I. & T. Ar. Ft. Worth	* *	4:3 7:5			м. м.		*	2:25 5:50			
1,109 1,275	Lv. Ft. Worth-H. & T. C. Ar. Hearne			_					6:10 12:50			
1,366	Lv. Hearne-1. & G. N. Ar. Aus in "Ar. San Antonio"							* *	1:00 5:20 8:35	A.	M.	k.

c. Pullman Sleeper from Chicago. k. Pullman Sleeper from Kansas ('ity.

† Daily except Sunday. † Daily except Saturday.

The first and most important item of information wanted in connection with through time tables is the sleeping-car service; the above table shows on the train leaving Chicago at 6:00 p. m., a sleeper, Chicago to Ft. Worth, and on the 10:10 p. m. train a sleeper Chicago to Washington, Ia., and one from Kansas City to San Antonio, Tex. This manner of designating sleeping car service could be used to advantage in the Official Guide where space is at a premium. Thus separate and volum inous foot notes can be dispensed with where space is limited. It is an ocular help and relieves one from car rying the equipment in the mind while looking up the time of a train.

The signs used to show whether trains are daily or The signs used to show whether trains are daily or not ought, of course, to be uniform on all roads and those which have been adopted by the *Official Guide* are perfectly suitable. No matter what folder is opened, wherever an asterisk (\*) is seen, it should convey the idea that the train to which it refers runs daily. Likewise with the other signs.

Many folders have rather uncertain ways of describing m. and p. m. time. They say that a. m. time is shown in light figures and p. m. time in heavy figures. This is indefinite and misleading when we come to the noon and the midnight hours. Is 12:00 in heavy type the noon or the midnight hour? Here is another case where uniformity is desirable. It would undoubtedly be well to universally adopt the system used in the publication referred to above, explained therein as follows: "From 1:00 a, m. to 12:59 noon light faced faced type is used From 1:00 p. m. to 12:59 night dark faced type is used."

If in a through time table a train runs over more than

one railroad, it is considerate to show the arriving and the leaving time at the coupon points, and, on the same line with the station name, the initials of the railroad. Frequently it is desirable to show the time to a number of stations on a road connecting with a through-car line Below is a portion of the condensed time table of a through sleeping car run from Chicago to Portland, Me. At certain stations along the route connection is made with different railroads for summer resorts. The traveler will surely ask the ticket agent how far he can take the through-sleeper, at what time he leaves it, how long he will have to wait at the junction until a train can be taken to his destination, and what time he arrives there. These are most natural questions, and the information furnished ticket agents should be presented in such form

that they can answer them.	
Lv. CHICAGO11:30 P. M.	via M. C.
LV. DETROIT 9:40 A. M.	•
AR, NIAGARA FALLS 5:32 P. M.	**
LV. NIAGARA FALLS 8:26 P. M.	66
AR. BUFFALO 9:10 P. M.	**
Lv. Buffalo 9:15 P. M.	via N. Y. C. & H. R.
LV. ROCHESTER 11:00 P. M.	41
AR. SYRACUSE 12:50 nt.	44
LV. SYRACUSE 1:00 A. M.	via R. W. & O.
AR. NORWOOD 6:00 A. M.	••
Lv. NORWOOD 6:40 A. M.	via C. V.
AR. MOIRA 7:15 A. M.	**
Lv. Moria 9:45 A. M.	via Nor Ad.
Ar. Tupper Lake  11:50 A. M.	
Lv. Moira 7:15 A. M.	via C. V.
AR MALONE 7:44 A. M.	**
Lv. Malone 9:20 A. M.	via N. Y. C. & H. R.
Ar. Saranac Lake. 11:10 A. M.	**
LV. MALONE 7:44 A. M.	via C. V.
AR. MOOKRS JCT 9:09 A. M.	**

Have the stations through which the through sleep passes printed in capitals or heavy-faced type; the other type, and a note at the bottom explaining this; also explain how a coupon ticket should read for the run of the through car, Chicago to Portland. Something like this

M. C. to Buffalo.
N. Y. C. & H. R. to Syracuse.
R., W. & O. to Norwood.
C. V. to Swanton.
S. L. C. to Lunenburg,
Me. C. to Portland.

The ticket agent now has before him data enabling him to give about all the information he is likely to be asked for regarding this particular through-car run, and above all, he knows how to make out the ticket. We want sales

Through-car arrangements have an affiliation for through-time tables. This relationship is too close to bear separation and naturally they are mostly found next to the through-time tables. "Through-cars" should include sleepers, chair cars, coaches, baggage cars and dining cars. The method of showing this is cars and dining cars. The method of showing this nicely exemplified in the Michigan Central folders, will be seen below:

Leaves:
Chic:go ....11:30 P. M.
Arrives:
Grand Rapids...7.20 A. M.
Chlc. & Grand Rap. via G. R. & I.
Ist-class coach, Chic, to Gd. Rap.
Sleeping car, Chicago to Grand
Rapids.

There is another way, much appreciated by ticket agents. It is that devised and used by the Chicago & Northwestern, and while applicable to all railroads is particularly so to the larger ones. The starting points of through-car runs are taken in turn and the service from each given, with the leaving time of the trains. Under the heading, "Leave Chicago," we find the time certain trains leave for St. Paul or Omaha, for example, including the service to those points; and under the headings, "Leave St. Paul" and "Leave Omaha," will be found the time through-trains leave with their ser-

A road running both through and suburban trains should include time tables of the latter in the general folder, when it is possible to do so. It can hardly be ex-pected that all the suburban trains leaving Broad street station, Philadelphia, on the Pennsylvania, or those leaving the Twelfth street station, Chicago, on the Illinois Central, can be given in the general folder. But on roads where the suburban service is not so great there can be no good reason for not putting them in the time tables. They claim a place there on the score of completeness, and also to facilitate giving information to inquirers at a distance from the territory where the sub-urban trains are run. Assume the case of the passenger who wishes to reach some suburban station near Chicago, but whose through-train to that city does not stop there. Now the question with him is, is it better to get off the through-train at the nearest stop short of the destination and take a suburban train, or go beyond and take a suburban train back? This case really occurs many times actual practice.

Below is suggested an easily understood manner of arranging trains on a suburban card for public use :

Week Day Trains. | Daily Trains. | Sundays Only Trains.

Note that all trains in the first and second divisions un on week days, and all trains in the second and third

divisions run Sundays. Freight trains carrying passengers should be put on the same page and carded in the same manner as the senger trains. This excellent feature in a folder is passenger trains. This excellent feature in a folder is especially appreciated by commercial travelers and ticket agents, and is valuable for about the same reasons as those given for putting in suburban time tables.

In the local time tables issued by some roads neither "Lv." nor "Ar." is shown at the large number of the stations. Would it not be a good idea to have a notation on every page of a folder to the effect that "when not otherwise designated the time shown opposite a station is both the arriving and the leaving time?" Where any local train stops at a station five minutes or longer, both Now as to the signs used for local trains. The reader

feels great confidence in a time table when a sign appears at the end of the run of a train as well as at the beginning. It is comforting to see a \* at both ends of the column; then there is no doubt but that the train is a

daily one from start to finish.

Where there are any considerable number of branch lines it is well to group them by states.

Many a hunt is saved by showing the connection from the principal city of a system to stations on its branch The idea is an old one, but none the less important. For example:

	*10:30 P.M. *12:50 nt * 6:30 A.M.	85	Lv. Chicago Lv. Milwa'ke Ar, Sparta	Ar	*7:00 A.M. *3:15 A.M. *8:51 P M.	† 7:10 P.M
†2.30 P.M. 2:50 P.M. 3:20 P.M.	7:14 A,M.	0 6 12	Lv. Sparta Leon Melvina	Ar.	7:35 P.M. 7:14 P.M 7:02 P.M.	11:15 A.M
4:10 P.M 4:45 P.M †5.15 P.M	7:43 A.M. 8:02 A.M. † 8:20 A.M.	19 27	Cashton Westby Ar. Viroqua	Lv	6:46 P.M. 6:30 P.M †6:15 P.M,	10:20 A.M 9.50 A.M

Sleepers between Chicago and Sparta and between Milwau kee and Sparta.

The arriving and the leaving times of the main line trains at the junction station of the branch should be shown, as mentioned in speaking of through time tables. The sleeping car service from and to the junction point

can be shown by a line or two.

The information page should be divided into "Information for Passengers" and "Information for Agents.

Under the first heading, the stereotyped "Children between five and twelve years of age, etc., is susceptible of improvement. It is said, and candor compels us to admit, that the conscience of the most upright parent is capable of setting highest the region with the conscience of the most upright parent is capable. of astonishing elasticity when it comes to paying rail-road fare for his or her offspring. If the child is twelve years and 364 days old, it is maintained that it is twelve years old; for it is reasoned that as it is not thirteen yet, it must be twelve. The following is more definite, and is an advance over the old explanation: "Children who have passed their fifth birthday anniversary are half fare

passengers, and those who have passed their twelfth birthday anniversary are full fare presengers." In the "Information for Agents," it is suggested that the diverting points of tickets be fully given; the lines of other railroads over which there are trackage rights; and complete instruction as to the requirement for separate coupons. Even after a road has been absorbed or controlled by another, it may be deemed advisable not to change the ticket representation, or to request foreign

A full page of the folder could well be devoted to sleeping car rates. Rates should be given from more stations than is usually the practice. In giving these rates it is not necessary to mention the drawing room rate every time, but at the foot of the page give some thing in this shape:

When berth rate is \$1.50, drawing room rate will be... 2.00, ... 2.50, ... ... 3.00. ...

and so on.

In the "Junction Points and Connections," let every road connecting with a station be mentioned, and for ever discard the annoying, shiftless and unpardonable expression: "With railroads diverging," which does not give the information sought. Not every agent is supplied with the Official Guide, and he has to depend u on the folders sent him. Characters should be used to de-note whether each connecting road uses the same depot or a different one. Also whether direct track connection This information is beneficial in the transaction tion of special or theatrical business where cars must be run through, and is a desideratum of no small importance

The maps absolutely needed in a folder are compara-tively few. First comes the two-page map of the sys tem, best placed in the middle of the folder (we mean, of course, the book-folder). Then a one-page map of the United States, showing principal connections and giving the relative position of the road in regard to the country generally. Next a map of the suburban lines. If the terminus of the system is New York, Chicago, St. Louis, Buffalo, or any other large city, it would not be extravagance to have a page map of the heart of the city, show

ing the railroad depots, etc.
In closing, it may be repeated that the general folder is for the benefit of the traveling public and ticket agents, and it should be made simple, complete and comprehensible, that the greatest good may be derived from it. Let us hope the day will come when uniformity shall prevail throughout folderdom; when all who open the mystic pages can find what they seek. Things more impossible have been wished for.

# A New Jack.

We illustrate herewith a new form of jack in use in England, and which is being introduced into the United States by Alfred Field &

Co., 93 Chambers street, New York.
The jack is made in two patterns, one being operated with a ratchet, as shown, and the other by an ordinary round bar. The plain jack has but three parts, a right and left hand screw of steel and

two malleable iron heads. The former is made from one

piece of steel, the middle be ing left square, and afterwards drilled to admit the use of a bar. The action of the right and left hand screws simultaneously gives double speed.

jack can not only be used for lifting, but for adjusting, suspending, stretching and cramping. The arms on the

right are used as a vice or clamp by adjusting them and turning the screw to the right. For wire stretching the holes on either side are used. The heads are grooved in the form of a V for lifting or bending shafting.

The jacks are very light, one (plain pattern) capable of

lifting six tons weighing but 51/4 lbs. In this the diameter of the screw is one inch.

# Society for the Promotion of Engineering Education

The second annual meeting of the Society for the Promotion of Engineering Education was opened in Springfield, Mass., Sept. 2, by the reading of the annual s by the President, Prof. Geo. F. Swain, of the Massachusetts Institute of Technology.

On Tuesday morning a business meeting was held and

On Tuesday morning a business meeting was held and the following were elected members of the Council:

Mansfield Merriman, Lehigh Univ.
Wm. G. Raymond, Reasselaer Pol. Inst.
C. F. Allen, Mass. Inst. of Technology.
R. S. Woodward, Columbia College.
Cady Staley, Case School of Applied Science.
C. L. Mees, Rose Pol Inst.
J. M. Ordway, Tulare Univ.
An excursion to Holyoke furnished a pleasing feature for the afternoon's programme. for the afternoon's programme.

The following is the programme of papers presented: Entrance Requirements. Report of Committee, with dis-ussion. F. O. Marvin, Kansas State University, Lawrence

coussion. F. O. Marvin, Kansas State University, Lawrence, Kas, chairman.

The Scope of an Engineering School, with especial reference to its assuming duties now left to the preparatory schools, and extending its course on the other hand to include post graduate work. Wm. G. Raymond, Rens. Polytechnic Institute, Troy, N. Y.

The Present Requirements of American Engineering Schools in non-professionol studies. Louis E. Reber, Pennsylvania State College, State College, Pennsylvania.

The Elective System as Adopted in the Michigan Mining School. Prof. M. E. Wadsworth.

Grapnical Methods in General, How far taught. L. M. Hoskins, Stanford University, Palo Alto, Cal.

Text Books. Specifications for. 1. O. Baker, University of Illinois, C. H. Benjamin, Case School Applied Science, Cleveland, O.

Physics, C. T. Mees, Rose Polytechnic Institute, Terre Haute, Ind.
Mechanics. R. S. Wooden s. R. S. Woodward, Columbia College, New York, y. G. C. Comstock, University of Wisconsin,

Haute, Ind.
Mechanics. R. S. Woodward, Columbia College, New York.
Astronomy. G. C. Comstock, University of Wisconsin,
Madison, Wis.
Biological Studies for Engineers. C. W. Hall, Dean, College
of Eng. N. of Union.
Civil Engineering. if one Course. C. L. Crandall, Cornell
Univesity, Ithaca, N. Y.
Sanitary Engineering. Chas. C. Brown, City Engineer,
Indianapolis, Ind.
Geodetic Engineering. Mansfield Merriman, Lehigh
University, Rethlehem, Pa.
Mechanical Engineering. H. W. Spangler, University of
Pennsylvania, Philadelphia, Pa.
Electrical Engineering. D. C. Jackson, University of Wisconsin, Madison, Wis.
Teaching Industrial Applications of Electricity. Geo. D.
Shepardson, University of Minnesota, Minneapolis, Minn.
Mining Engineering, Regis Chauvenet, Golden, Colorado.
Mining Engineering Laboratories, H. O. Hofman, Massachusetts Institute Tech., Boston, Mass.
A Course of Instruction in Engineering Materials, J. B.
Johnson, Washington University, St. Louis, Mo.
Graduation, Theses and Degrees. Storm Bull, University
of Wisconsin, Madison, Wis.
Modified Requirements for Graduation of Students who
have taken full Literary College Courses. Ira N. Hollis, Harvard University, 'ambridge, Mass.
Comparative Value of Graduate Study in Engineering
Courses. \*Wm. H. Burr, Columbia College, New York City,
N. Y.

N. Y.
The Economic Element in Technical Education. L. S. Randolph, Blacksburg, Va.
Unsymmetrical Developement of the various courses in Engineering Schools. F. R. Hutton, Columbia College.
The Engineer of the Twentieth Century. E. L. Corthell, Civil Engineer.

Entrance Requirements.

The report of the committee is based upon replies re ceived in answer to two circulars sent to engineering colleges, and to preparatory schools. A large amount of useful material has been tabulated. The results show material differences as to requirements in various ways as to good morals, as to age, as to mathematics, so studies, English, language and drawing. Locality is seen to have noticeable influence in these matters. Considerable differences in practice and in opinion exist to procedure where "conditions" are incurred, and this is true also as to whether entrance shall be by examina-tion or by certificate. The report does not go beyond a partial presentation of facts, further investigation being postponed until another year.

Discussion.

Professor Merriman, of the committee, found it useful to distinguish the technical school by the term "college," and preparatory establishment, "school"; a distinction desirable for general use. He also thought in the mathematical requirements, quality should be insisted upon as fully as quantity. Professors Fava and Galbraith com-mented upon the effect of local conditions in modifying entrance requirements.

The committee was continued.

The Scope of an Engineering College.

The paper, to which much careful thought has evidently been given, advocates the following distribution of studies: The present preparatory schools shall assume all the culture studies, language, literature, history and social science, with practically no mathematics except arithmetic, and no physical science except simple facts without theory. The engineering college, free from all the above culture studies, shall include the subjects necessary for training in mathematics and the sciences, physics, chemistry, astronomy, geology, and shall include mechanics, but shall stop short of purely profes sional engineering subjects, but include manual training work, and shall lead to the degree of Bachelor of Science. An advanced professional school shall take up the professional engineering subjects and lead to an engineering degree, with an opportunity also for post graduate work leading to a doctor's degree. The writer advocates grant ing to the engineering public facilities for the use of laboratories for advanced investigations.

# Discussion.

The discussion showed a general disagreement with the views presented in the paper. It was thought that without mathematics the high school course was too narrow, and did not properly prepare a scholar to select between business and an engineering or a classical edu-cation; that the mental discipline of mathematics was necessary, and unless entered upon in preparatory schools, sufficient time for seasoning in mathematics could not be secured. The idea was also advanced that in the high school the scholar, being susceptible espe-cially to early impressions, should for breadth of culture

graduate work. Some question was raised as to the feasibility of the use of the laboratory by the engineering public.

Non Professional Studies,

As the result of answers to circulars sent to engineering colleges, there are found three classes of colleges:

1. Those whose work is practically purely technical. 2. Those which continue general culture work throughout an important part of the course. 3. A small number where the culture studies are elective. The amount of preparation does not mark the line between 1 and 2. the first term of the first te In others, the importance of fully maintaining culture studies is firmly insisted upon, and in cases there is even some change in that direction. The writer believes that many engineering colleges are leaning too strongly to the technical side, considering the preparation of their students, and are making narrow and one-sided engineers in an age where general breadth of culture is of special importance if the engineer is to achieve success.

The Elective System-Michigan Mining School.

While recognizing as the principal defects of the Syswhile recognizing as the principal defects of the System of Electives (1) the neglect of proper sequences, and (2) the tendency for instructors to secure students by providing "soft" courses, the writer believes that the signs of the times indicate that every engineering college in the land must and will adopt the elective system, the complete application of which to that school is outlined and is to take effect the coming school year.

The discussion failed to support the opinions held by

the writer. The difficulty of including essential sub-jects in a four years' course in mining was pointed out, and it was thought that the heterogeneous courses and greater freedom of choice common in mining courses, was the cause of the decrease in number of mining students which is known to have occurred in this country. Attention was called to the fact that the scheme advo-cated is still untried at Houghton. The tendency of the Massachusetts Institute of Technology is in the other direction as the result of several years of late experience.

Specifications for Text Books.

The necessity for improved quality in text books is pointed out. Improvement is to be reached by the following specifications:

Arrangement in proper sequence.
Language, clear, concise, forcible.
Titles and headings, so that any part is easily found.
Diagrams in the text in convenient place, and properly

Diagrams in the text in convenient place, and properly cribed.
Folding plates at end and provided with stub.
Sections numbered continuously throughout.
Crass reference to pages.
Clear typographical arrangement of formulas.
Nomenclature, rational, and stated previous to use of

ymbols.

10. Tables numbered, and with descriptive title.

11. Convenient division of tables by spaces or lines.

12. Numbering of horizontal divisions.

13. The several columns convenient relatively.

14. Minor matter in smaller type.

15. Full index to pages.

16. Tables at end preceded by list of titles.

17. Good mechanical execution.

In the discussion, attention was called to the effect of margin in size of book. Johnson's surveying, except for a few tables, could be made the size of Searle's Field En-gineering. Some books would be improved if in two gineering. Some books would be improved if in two volumes. The importance of rational notation was fully urged, and a committee suggested to secure more uni-

form notation. The values both of introduction and of appendix were commented on. It was thought that for students' use care should be taken not to do too little for clearness or too much to relieve the student from indi-

Graphic Methods.

Graphic methods are held in various esteem by traphic methods are held in various esteem by teachers, due in part to early training. Some give too much, some too little time to this subject. Graphic as compared with algebraic methods fail in generality and in precision, and find their most common use in problems pplied mechanics.

The chief advantages are saving of labor and the greater clearness of view often gained from graphical presentation. Most problems can be solved by algebra even though graphic methods are better. Whether a special course in the subject should be introduced or at-tention given at the proper time in special courses is a suitable question for consideration. Graphic statics is not the only, if the best known and most used example. The student should be taught to look for suitable occasions for using graphic methods of various sorts. No definite rule can be laid down as to time to be given the subject.

The discussion discovered some members who believed an undue tendency exists toward graphic methods. Some thought graphics more general than algebra, and in both the paper and discussion attention was called to the importance and value of greater or better attention The claims of the slide rule were urged as to geometry. a very useful form of graphic logarithms.

Drawing and Shop Work.

Drawing and shop work may properly be considered together, and have great educational value, enough to fully justify their adoption in preparatory school. In engineering colleges they find place also for their practical utility. Methods adopted in teaching should be in harmony with best shop practice, examples of which should be available for students' inspection and use. Shop work should have as final result, finished me chanics, not for purposes of revenue but as a stimulus secure something of science, art, literature, history and mathematics; and that all these lines should be maintained in the engineering college, and even in post-be spent on those parts that result in mere handicraft.

Free hand drawing is the higher type and should follow, not precede, mechanical. It finds extended use in sketches of designs, etc. There is much divergence of opinion as to time to be devoted to these subjects.

The discussion showed considerable disagreement of opinion, some opposing, some supporting the ground taken in paper as to details in the opinions presented.

# Proposed Drainage System for the City of New Orleans.

In February, 1893, the City Council of New Orleans passed an ordinance providing for a complete system of drainage for the city. Later, Messrs. Rudolph Hering, B. M. Harrod and H. B. Richardson were appointed an Advisory Board of Engineers.

no inducement for improvement. The improved portion of the city is on the most elevated parts of the ter ritory

ritory.

The New Orleans navigation canal, and the Carondelet navigation canal and Bayou St. John, extend in from the lake to Rampart street and are used for navigation purposes, allowing commerce to reach the city from Lake Pontchartrain. The present drainage consists of deep gutters on both sides of every street, leading to canals which in turn carry the water to four draining machines. These discharge into Lake Pontchartrain. The system is wholly inadequate, a principal reason being that all the foul water on the improved portion of the city flows down the slope through numerous street gutters to low ground in the rear and thence to the draining machines through artifical canals with in-

There are three possible places into which the sewage can be discharged—namely, Lake Pontchartrain, the Mis issippi River and Lake Borgne. The former is at present used, but the proposed plan provides for the use of Lake Borgne, since its borders are mostly uninhabited, and it is open to the Gulf, thus causing a rapid removal of the drainage water by the tide movements. In the case of heavy rainstorms the excess of water which could not be accommodated by Lake Borgne There are three possible places into which the sewage water which could not be accommodated by Lake Borgne could be discharged into Lake Pontchartrain.

The territory within the limits shown on Fig. 1 has been divided into six parts, numbered from 1 up to 5, the sixth section, called the Algiers section, being on the south bank of the Mississippi. The boundaries of these sections are shown in Fig. 1. A fundamental feature of the drainage plan is the main canal shown in Fig. I, which extends from the intersection of Nashville and Claiborne street to Bayou Bienvenu, which in turn leads Claiborne street to Bayou Bienvenu, which in turn leads to Lake Borgne. This canal is located in the lowest depression between the river and the ridges before mentioned, and thus it makes the greatest use of gravity in draining the city. The duty of this canal is to remove not only the daily flow of sewage, but all run-off during storms from the several sections, which does not exceed its capacity. It also serves as a basin for collecting storm water while the pumps are being started. The surface of the ground along its line is practically level. Its length is seven miles and its width about 70 ft., although its exact dimensions will depend upon future conditions, it being not included among the work to be first done. it being not included among the work to be first done. Its depth is limited by the stability of the subsoil and varies from 14.5 to 16.5 ft. below the natural surface Along the main canal will be five pumping stations, as shown, to give the water in its flow the necessary velocity. The canal has been provisionally designed for 3,000 cu. ft. of water per second. During light rainfalls 3,000 cu. ft. of water per second. During light rainfalls it will not be necessary to operate all the pumps; but in heavy rainstorms they will all be brought into service. Provisions will be made at each pumping station for cutting out the pump at that station so as allow the water to flow unimpeded. Fig 3 shows a section of the main canal. It is proposed to line its notice had each eiter with smooth and permanent. its entire bed and sides with smooth and permanent its entire bed and sides with smooth and permanent material of some kind to insure cleanliness and good velocity. Special methods will have to be adopted at points where the canal crosses the navigation canals previously mentioned. From the main canal branch canals diverge, and separate into main drains, branch canais diverge, and separate into main drains, branch drains and surface gutters, providing for the complete drainage of the city. The water in the branch drains flows into into main drains whose general direction is at right angles to the branches. The locations of the drains planned is shown in Fig. 1, except that of the surface

In drains lined with masonry the velocity may be as great as any obtainable in the city, about 8 ft, per second. Computations for unlined channels have been made with a maximum velocity of  $3\frac{1}{2}$  ft. per second. The least velocity in masonry lined conduits for the removal of storm water has been assumed at 3 ft. per second, and for the removal of ordinary flow 6 ft. per second, to prevent deposits. The pumping stations along the main canal will, of course, increase the velocity by making an

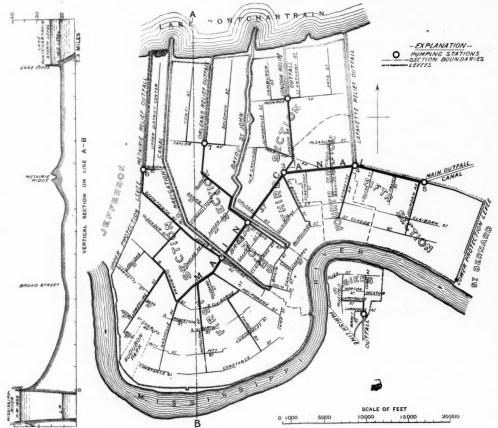


Fig. 1.-Map of the City of New Orleans, Showing Proposed System of Drainage

The present condition of the drainage system of New Orleans is exceedingly bad. Much money has been spent without following any general plan and the lack of data as to the topography of the city has made it impossible to carry on the work properly. The system at present is crude, consisting of drains and canals insufficient in size, death and slove coupled with inefficient and weepones.

No. of sections. depth and slope, coupled with inefficient and uneconomical methods of pumping. The method of disposing of the water is also objectionable from a sanitary stand-

The drainage question at present applies principally to the removal of rain water falling in the built up parts of the city; that is, water which does not soak into the ground, but runs off through the gutters, flooding the ground, but runs off through the gutters, flooding the streets and causing damage to property, and interfering with travel and business. It also applies to the removal of ground water, saturating the soil and causing unsanitary conditions. Many blocks in the city are not now built up, being practically swamps, from this reason. The area which the proposed system includes is limited by the boundaries shown in the map, Fig. 1.

The land is so low that pumps are used for lifting the rain and ground water to insure its flow. The new system

rain and ground water to insure its flow. The new system will adopt this method, especially along the proposed main canal, pumps being placed at intervals to raise the water and keep it in motion. The question of disposal must be answered in the light of two conditions. The ordinary flow of water should not be delivered where even its slight pollution would injure the value of ad-joining lands. It should be discharged at points where no considerable development is expected in the future. Among the provisions of the plan is the maintenance of two existing navigation canals, the river ends of these canals, as far as Broad street, to be made available for drainage. On the lake side of Broad street they should be preserved an 1 kept free from surface water on account of resulting deposits.

The territory to be drained is highest along the banks of the Mississippi River, where the elevation of the ground is about 33 ft. above the Cairo datum, which is 21.26 ft. below mean Gulf level. The ground slopes from the river toward the lake for a distance of about 9,000 ft. Here the average elevation is 20 C. D. From the foot of the slope to the lake the ground is practically flat, with the exception of two ridges running parallel with the shore of the lake about 2¼ miles from it. A large portion of the basin to be drained is below mean Gulf level, as shown in the profile, Fig. 1. At present this portion is swamp;, and practically waste land, offering

No. of sections.		nd Drains.	Main	canal.	Out-fail capals.	Pumpin	g stations.	Total cost,
	Lined.	Unlined.	Lined.	Unlined.	Unlined.	Main.	Auxiliary.	
FirstSecondThirdFourthFitthAlgiers	\$1,901,062 850,310 465,294 233,037 49,500	\$378,365 212,676 143,312 51,786 79,948 41,720	\$ 300,000 390,000 534,000	\$124,125 	\$15 000 23,001 11,000 10,000 50,000	\$125,000 120,000 118 750 196 250 475,000 54,750	\$312 500 287,509 231,250	\$2,856,352 1,793,486 1,362,506 1,025,073 744,304 151,970
Total	\$3,499,203	\$909,707	\$1,224,000	\$_63,781	\$112,000	\$1,093,750	\$831,250	\$7,933,691

ATTACAMBATE ESTIMATE OF COST FOR THE IMPROVEMENT OF THE SECOND SECTION AS RECOMMENDE.	
First. Pumping stations Nos. 2 and 7	300,006
covered. 8 Third. Improvement of Relief Branch Canal, between pumping stations Nos. 2 and 7. 1 Fourth. Improvement of Orleans Resief Out-Fall Canal, between pumping station No. 7 and the lake.	850,310 128,000 23,000
Total cost	

chines from which, together with other data obtained

To obtain figures of the run-off, gagings were made of the water discharged daily at the several draining mawater the surface water will be discharged into Lake

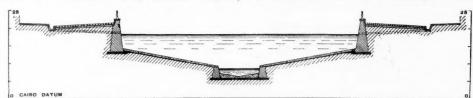


Fig. 2.- A Section of the Main Canal-New Orleans Drainage System

from six rain gages, and by the use of approximate formulæ, a run-off diagram has been prepared showing the into branch relief channels. The locations of these remule, a run-off diagram has been prepared showing the greatest probable rate of water in cubic feet per second, running off from areas extending up to 1,200 acres. The curves shown on this diagram indicate the maximum rate of rainfall which it is proposed to provide for. They are based upon the assumption that the present practice of allowing water to stand on the street surfaces will be discontinued, the water entering the drains promptly. For the future growth of the city an allowance of from 15 to 20 per cent. was added to the run-off.

lief pumps are shown in Fig. 1.

The draining of Algiers on the right bank of the Mississippi is accomplished by a system of gutters and drains leading to a main canal located on Canal avenue, as shown in the engraving. The main pumping station is located near the intersection of Lawrence street and Canal avenue. The total run-off of the section is 671

The above table shows the approximate cost of the

drainage system as estimated by the Board of Engineers In general the canals, branches and drains between the river and the main canal should be lined with masonry and many of them covered with the street pavement Those between the canal and the lake, however, need not be lined for years to come. Bridges will of neces built at numerous points across the uncovered canals and branches, and these must not obstruct the free flow of the canals, and should allow as far as possible the passage of dredge boats. It has been judged that that part of the second section lying between Broad street and the river should properly receive the first attention in the carrying out of the work. Hence the special estimate for this section given above. The work on the other sections may be carried on in any manner, or at any time, as found most convenient, but its urgency should cause it to be finished as soon as possible.

#### TECHNICAL.

#### Manufacturing and Business.

Mr. James Emerson, of Holyoke, Mass., proprietor of well-known steam heating devices for passenger cars, has arranged to have his patents passed upon by the Eastern Railroad Association

"The Railways Securities Co.," with a capital of \$250, 000, is applying to the Dominion Government for a charter to acquire rolling stock. The head office is to be at Winnipeg. The promoters are mainly the owners of the Allan Steamship Line.

The National Paint Works, of Williamsport, Pa., h during the past month, taken orders for 1,500 barrels of paint. They are now furnishing paint for the Park Avenue Improvement Co., New York City, the Terminal Station at Providence, R. I., and to the Louisville & Jeffersonville bridge.

The New York Equipment Co. has just sent to Jamaica, West Indies, the first cargo of 20,000 creosoted crossties for the Jamaica Railway. These were furnished by the Eppinger & Russell Co., of New York City steel cylinders for one shore pier of the Wag Water River Bridge (Jamaica), made by the Pennsylvania Steel York Equipment Co., last week.

The Niagara Falls plant of the Pittsburgh Reduction Co. began operation on Aug. 28, with power obtained from the Niagara Falls electric plant. At present about 1,600 H. P. is used by the plant, but it is expected that when the full force is working 5,000 H. P. will be

The Phosphor-Bronze Smelting Co., of Philadelphia has just purchased the processes and exclusive rights for the manufacture of Delta metal in the United States and is now prepared to furnish the same in castings, stampings, forgings, bolts, rods, etc. This metal has been used throughout England and the Continent for propellers, heavy and light gearing, drop forgings, stampings, shaftings, valve stems, etc. Exceptionally high properties are claimed for it, its strength being, the makers say, equal to that of mild steel, in addition to which it has great rigidity, toughness and resistance to corrosion. The company does not offer this alloy as a substitute for its "Elephant Brand" phosphor bronzes, but recommends it as the best alloy of its class.

The Westinghouse Machine Co. reports business as having been very active for some time past, and the outlook more than encouraging. Orders for compound engines were received during August from the American Hydraulic Dredging Co., of Massachusetts, the Glovers ville Electric Co. and other electric companies, and a number of miscellaneous corporations. ders for compound engines during that month included one engine of 300 H. P., 3 of 160 H. P., 2 of 200 H. P., 3 of 80 H. P., 2 of 125 H. P., 2 of 100 H. P., and 8 of 250 H. P.

## Iron and Steel.

The Pittsburgh Steel Casting Co., whose plant is at Twenty-sixth and Railroad streets, is constructing a new 20-ton open hearth steel furnace, which is expected to produce 40 tons a day. This will about double the present output. Probably another similar furnace will be built on completion of the first.

## New Stations and Shops.

The Pennsylvania is to build a very large warehouse at Cincinnati, O., and plans for the building have just been completed by M. J. Becker, chief engineer. The contracts for the building will be given out soon. Before work on the structure can be commenced it will be necessary to tear down a number of old buildings

The contractors are now working on the foundations for the new house and repair shops of the Baltimore & Ohio, at South Cumberland, Md., and considerable progress is being made in the erection of the structures.

Plans of the new station to be constructed jointly by the Canada Atlantic and the Ottawa, Arnprior & Parry Sound railroads have been filed with the Minister of Railways. The station building will cost \$50,000.

Work has started on the construction of the new

roundhouse and car shops for the Ottawa, Arnprior & Parry Sound, at Ottawa, which are to be used jointly with the Canada Atlantic.

# Cheap Interlocking for a Crossing.

In connection with the Hall automatic block signals now being erected on the St. Louis, Keokuk & Northwestern

nanner, the arrangement being such as to afford the best protection under the circumstances without going expense of employing a regular attendant. crossing is of a minor single track line across the two main tracks of the railroad. The single track line haderailing switches each side of the crossing; these nor mally stand open and the conductor or brakeman of any train wishing to cross must close them before the train can pass. These derailing switches are connected with circuit breakers and are equipped with indicators, as is done with an ordinary switch where automatic block signals are used. If a man attempts to close one of the derailing switches when a train is approaching on the main line he is warned by the indicator, but whenever he closes it in accordance with the regulations, no main line train being near, the movement of the switch auto matically sets the signals, both north and south, at danger, so as to stop approaching trains. This plan is somewhat similar to that put in by the National Switch & Signal Co., on the Chesapeake & Ohio at Catletts burg, Ky., at the crossing of a street railroad. There a street car conductor has to go into a tower and set the C. & O. signals at danger before he can send his car and while the signals are thus set he is locked inside of the cabin.

#### A Large Bridge for an Electric Railroad.

The City & Suburban Electric Railway, of Baltihas been extending its lines to various points along the different roads leading from the city. Among other extensions is that from Point Breeze to Dundalk, where the large foundries of the Henry McShane Manufactur-ing Co. are located. On the line of this branch there is a very long trestle and a steel drawbridge recently com-pleted, which is a work of considerable size when we consider that it is solely for street railroad use. The trestle is about 1,600 ft. long, with a double track over its whole length. The draw span, which is about one-third of the distance from the Point Breeze terminus of the es Colgate Creek, a navigable tributary of the line, cros Patapsco River.

Throughout the trestle and bridge the track centers are 12 ft. apart and the top of the rail is 111/2 ft. above mean low tide. In addition to the railroad tracks the bridge is provided with two 4-ft. 6-in. sidewalks. The trestle west of the bridge is 555 ft. long and consists of one double shore bent and 46 single bents of piles spaced 12 ft. c. to c. The eastern trestle is 893 ft. long of one double shore bent and 74 single bents. The draw is a steel plate girder swing span, 112 ft. 9 in. long over all, resting on a steel drum 20 ft. in diameter. It is comosed of four steel plate girders two 201 ft. long and two 202 ft. 6 in. long. The drum revolves on 20 rolle 12 in. in diameter running on a circular track resting on a cast iron base plate which in turn is placed on a concrete base 24 ft. in diameter and about 2 ft. 6 in. thick. This concrete rests upon a grillage placed on the tops of 69 piles, ferming the center pier. The total weight of the draw is 65 tons, but it is accurately bal-

anced and is easily manipulated by hand.

The electric power current for the cars is carried past
the draw by a cable passing down into the bed of the river from the piers at the ends of the draw span. The electrical outfit was supplied by the White-Crosby Co. Mr Frederick H. Smith was the designer and consulting engineer for the entire work. This trestle and bridge is one of the largest pieces of engineering undertaken by any of the street railroads in and about Baltimore.

## Traction by Fireless Locomotives.

The line of railroad from the heart of the city of Marseilles to the great necropolis in the quarter of St. Pierre is 1.86 miles long, 2,394 ft. of which is a tunnel. Upon it, on this account, fireless locomotives are employed, avoiding all escape of smoke or steam. These locomotives consist in part of a cylindrical receiver, charged with warm water at a maximum pressure of 227.5 lbs. per sq. in. At the end of a run this drops to from 43 to 71 lbs. er is then reheated to 203 deg. C., corresponding to 227.5 lbs. pressure by steam from the generators at the central station. The cylindrical warm water receiver is 19 ft. by 3.8 ft., holding 550 gallons, and about 21 cu. ft. of steam. The steam from the generators is equally distributed throughout the warm water by means of properly arranged pipes. It is condensed, after being used in cylinders, in a condenser over the receiver consisting of 1,154 tubes representing a cooling surface of 538 sq. ft The cylinders of the locomotives are placed outside frame. There are four coupled wheels, and the engines in working order weigh about 12 tons. The gage of the line is 3.28 ft. The average weight of the cars used is 4.37 s, giving a dead weight to each passenger of 187 lbs., which is exceedingly low.

The trains are composed of an engine and two cars, 50 trains being run in each direction on week days, and 62 on Sundays and holidays. The maximum speed is 121/2 miles an hour.

## Richmond Compound.

The Richmond compound 10-wheel locomotive No. 2,427, which has been undergoing service tests on several roads out West, completed the freight tests on the Chicago & Northwestern Railroad Aug. 29, and on the 30th had a trial in fast passenger service on the same road. The run was from Chicago to Williams Bay, Wisconsin, a distance of 76.4 miles. The Wisconsin division over which this run was made has very heavy grades and numerous curves, which necessarily prevent any very great speeds being attempted. The train hauled consisted of three baga grade crossing is to be protected in a somewhat novel gage and express cars, two ordinary passenger coaches and as from 70 to 80 per cent.; that of each transformer at

three parlor cars. The time on the road was 2 hours and actual running time 1 hour and 50 minutes. The first 38 miles to Carey, III., was made in 58 minutes, which in cluded a three-minute stop at Desplaines for water. In everal instances miles were made in 55 seconds, this time being taken between mile posts. No attempt was made to exceed the scheduled time, the only object being to show the manner in which the engine could be worked in this service. The ease with which the train was hauled over the grades and pulled out of the sta tions, together with the steaming qualities and smooth-ness in running made a favorable impression on all the party aboard.

The service tests which have been made with this locomotive have been very favorable to its economy. It has shown a decided saving over simple engines of the same class and has given evidence of its speed capabilities when worked in passenger service. After leaving the Chicago & Northwestern it will be taken to the Atchison, Topeka, & Santa Fe for similar tests. After these are completed, it will be sent to the Illinois Central and. those tests, will be taken to Atlanta to be hibited at the Exposition.

Mention of the tests on the Chicago, Rock Island & Pacific, together with a brief description of the engine, will be found in the Railroad Gazette of July 12, 1895.

#### Street Car Heating.

Broadway Cable Railroad of New awarded the contract for heating its cars to the Gold Car Heating Co. All of the cars which are to be finished this season are to be equipped with the Gold jet system of circulation, an apparatus somewhat similar to that installed by this company in the cars of the Third Avenue Cable road in New York last year, which has given satisfactory service. The equipping of the cars will be begun next month, and will proceed at the rate of from 20 to next month, and will proceed at the rate of from 20 to 40 cars a week. The system to be used will place the heating pipes under the seats, and these pipes will radiate the heat into the car. The cost of supplying the heat will be less than 8 cts. a day. The heat is supplied to the apparatus in each car from its own individual source.

#### Steel Canal Boats.

A fleet of steel canal boats reached New York, Aug. from Loraine, O. It consisted of one steam propeller carring 125 tons and five consorts carring 230 tons each.
The vessels were built by the Globe Iron Works of
Cleveland on the order of the Cleveland Steel Canal Boat Co., which company has been organized during the past year. The cargo of the fleet was steel rails for the Metropolitan Traction Co., and the Staten Island Rapid Transit Co. In general appearance the boats are like ordinary canal boats. They are 96½ ft. long, 17 ft. 11 in. wide and 10 ft. deep. The steam propeller is equipped with a fore-and-aft, compound, condensing engine with 10 and 18 in. cylinders, having a 16-in. stroke. The engine is 120 H. P. This boat is also equipped with one Scotch boiler.

These boats are an experiment. The intention is that they shall take lake insurance and go direct to and from Cleveland, avoiding change at Buffalo. The cost of each boat is about \$5,500, which is probably double the cost of an ordinary wooden canal boat. It is intended to maintain a speed (loaded) of about six miles an hour. may be used for grain, avoiding elevator charges at Buffalo.

## More Conduit Roads for New York City.

The success of the underground conduit system recently installed on the Metropolitan Traction Company's Lenox Avenue line is said to be such that the introduction of similar systems on other roads in the city in the near future is contemplated. Steps are now being taken to secure the consent of property owners along the Twenty-third street, the Ninth avenue and Belt lines for the substitution of electrical traction for the horse power now used. An eastward extension of the 116th street line is also contemplated. It is said that the underground system in use on Lenox avenue has effected a saving of four cents per car-mile over the cable system and eight cents per car mile over the roads operated by horse power. Since the yearly car mileage of the Metropolitan Traction Co. is estimated at 18,000,000, this saving means a great deal to the company and will be a strong inducement for the further introduction of such lines. It is probable also that the saving will be greater in the case of lines built in the future, since the Lenox avenue line was built more expensively than was necessary owing to doubts entertained as to the success of the electrical system; that is, the road was prepared for use as a cable line in the event of the failure of the electrical system. Mr. John D. Crimmins is reported as having authorized the statement that the Metropolitan Traction Co. expects to have all its lines in this city in operation with electricity in about five years

# Transmitting Power by Electricity.

A paper in the Memoirs of the French Society of Civil Engineers, in treating the subject of electric transmission, says that the limit of tension in which continuous currents can be successfully used, is from 2,000 to 3,000 volts. When the length of the line makes high tension necessary, alternating currents must be used. In using currents of say 10,000 volts, the usual practice is to generate a current at moderate tension, transform it to high tension for transmission and then transform back again to low tension for distribution. The commercial efficiency of the alternating generator is given as from 80 to 85 per cent., that of the alternating motor

full load as 95 per cent.; and that of the line with overhead wires as from 85 to 95 per cent. according to distance. This gives the total efficiency of the electrical apparatus with two transformers from 61 to 72 per cent. when the current is used for lighting and from 43 to 58 per cent. when used for motive power. This paper mentions three instances of transmission—two in Italy and one in California-the distances being 15 miles 151/2 miles and 28 miles respectively.

# THE SCRAP HEAP.

The train robbery on the Union Pacific, in Nebraska Aug. 21, proves to have been the work of two young Danes, who have been farm laborers in that state for a dozen years, and who were not regarded as desperate characters. They have been captured and sentenced to 19 years' imprisonment.

The railroad crossing war at Jersey City is suspended. The Junction Railroad secured an injunction against the Pennsylvania, and the representatives of the latter, according to their own statements, have agreed to take no further action until Sept. 16, when Chancellor McGill will return from Europe. They say that the Junction will return from Europe. They say that the Junction Company meanwhile will build its arch, but do no work upon the tunnel.

Lake Notes.

There has been a sharp advance in lake freights, and ore from the head of Lake Superior is now going at \$1.05, 15 cents higher than two weeks ago. Wheat freights have been taken at Duluth the past week at 3½ cents, equal to \$1.25 on ore, and 5 cents for wheat is predicted. Coal freights are now at 40 cents to Lake Superior.

The Chicago Shipbuilding Co. will build a package freight steel steamship, 345 ft. over all, costing \$225,000, for Orr & Elphicke, of Chicago, and M. M. Drake, of Buffalo. At Ashtabula docks of the Minnesota Iron Co., work was begun on the ore cargo of the steamer Kearsarge at morning one day last week and by midnight the vessel was away from the docks, having had 2,750 gross tons of ore taken out of her and 2,650 tons of coal put on board. All but 200 tons of the coal was loaded by one of the McMyler dumping machines.

The Canadian "Soo" Canal was opened Sept. 3. It

The Canadian "Soo" Canal was opened Sept. 3. I will be of little use to the lake shipping this year be cause of certain obstructions in the entrance channels.

#### Church Cars in Siberia.

Church Cars in Siberia.

The Russian government has had constructed five church cars for use on the Trans-Siberian Railroad. The road runs through territory in which there are scarcely any inhabitants. The total population is 3,8%,0%,0%, and the average per acre is less, therefore, than one inhabitant. The church cars are embellished with all the accessories of an orthodox Greek church. Each church makes two stops a day, and thus it is possible to have religious services of the Greek church in 70 settlements each week.

The Ubiquitous Bicycle.

At the shops of the Pittsburgh, Cincinnati, Chicago & St. Louis, in Columbus, O., there are about 150 employees who come to their work on bicycles, and, of course, this number of machines standing around in the way all day became quite a nuisance. The Master Mechanic has therefore built two "stables," one to to hold 25 machines and the other to hold 60. These stables consist simply of light posts, with rafters along and against a tight board fence or building, and covered with some cheap form of roof. There is a tie from each post to the fence which forms the partition between the stalls and also serves as a support for the wheels. The stalls are about 2 ft. wide and 6 ft. deep. Each stable is in charge of some office boy or other employee, who gives out checks to the owners of the machines, each stall being numbered.

# A New Panhandle Caboose.

A New Panhandle Caboose.

At the shops of the Pittsburgh, Cincinnati, Chicago & St. Louis, in Columbus, O., an 8-wheel freight caboose has recently been built in which there are a number of minor improvements over the present standard of the road. The cupola is 15 in, higher than the old pattern, the top of the roof being 15 ft. from the top of the rail. There is no ladder on the outside of the car, access to the roof being had through doors 21 in. × 39 in. in the ends of the cupola. The trucks are arranged for 36-in. wheels, this being the size of the standard wheels used under passenger cars, which, when partly worn, are transferred to cabooses. The new car has eight longitudinal sills, two more than have heretofore been used. The platforms are 31½ in. long, being 10 in. longer than the old standard.

are 31½ in. long, being 10 in. longer than the old standard.

A safety bar is provided in the gangway at the center of the handrail. The frame of the car has been made stronger, the posts and braces being 1½ in. × 3½ in., while in the old car they were 1½ in. × 2½ in. The cupola being higher, it is braced with iron braces running down to the side plates. There are two stationary outside seats upon each end of the cupola provided with safety bars and handrails. The roof of the cupola is made circular in form with a radius to conform to the roofs of the smaller tunnels upon the road. The car has a water tank, a wash bowl, a folding table and large lockers. There are drip pans to catch all leakage and overflow from the oil cans. A stretcher is kept under one of the bunks. There are no projecting iron handrails or steps inside the car.

## Plain Language.

The following paragraph from an editortal in the San Francisco Call, entitled "A Message from the People for Mr. Clark," will give the reader an idea of how an elective Railroad Commissioner sometimes feels:
"At the next meeting of the Railroad Commission Mr. La Rue will move the adoption of the schedule of transportation charges upon grain which at the last meeting of the board he presented. Do you intend, Mr. Clark, to adopt or to oppose the adoption of this schedule? If you intend to oppose it, what will you have to offer as a substitute for it? What will you have to show as the reason for your opposition? It will not do to do nothing in this matter. It will not suffice to plead ignorance as to whether the schedule of Mr. La Rue is just or unjust. It will not constitute a performance of your official duty to urge delay in the adoption of this or of some other schedule. The grain product of the state is now being moved, and it is imperative that the freight rates upon this commodity should be adjusted at once if the producers are to receive any benefit from their re-

duction during the present year. You must, therefore, be prepared to act next Wednesday. Is it not clearly your duty to require the railroad company, out of the fullness and exclusiveness of its knowledge of the cost, expense and earnings of its roa's, to establish that their present rates are reasonable, instead of requiring the people of California, out of their meagerness of knowledge of railroad finances, to prove that they are not? The eyes of the people are on you. The enemies of your party are asserting that you are a railroad tool, and that in this emergency you will be true to it and false to your trust and to your party. Mr. Railroad Commissioner Clark, the people of the State of California ask you plainly, What do you intend to do?"

The Illinois Central and the Lake Front.

# The Illinois Central and the Lake Front

As a result of the conference between the Illinois central officials and those of the city of Chicago the fol-owing terms were agreed to concerning the possession f the lake front, between Randolph street and Park Row.

1. The Illinois Central is to construct two retaining walls n = on each side of its right-of-w vy, between the above-menioned streets; one retaining wall on the south line of Ranolph, between Michigan avenue and their right-of-way, and ne retaining wall on the north line of Park Row, between lichigan avenue and their right-of-way.

2. Depress the tracks 4 ft, between Randolph street and Park Row.

Depress the tracks 4 ft, between Randoiph service, rk Row.

Construct a new passenser station for suburban service, ich shall be below the proposed surface of the park.

Build four viaducts across the tracks at such treets as city may designate, between Randoiph and Park Row.

Build foot-ways across the tracks in the line of the other

5. But the Randolph street viaducts of as to afford access to the newly made ground east of the tracks.
7. To have the right to use the 11/ht-of-way between Randolph street and Park Row for any legitimate purpose, free from restriction, except that no buildings shall be erected exceeding the height of the retaining walls
8. To construct of timber, earth and loose stone the sea wall at the eastern and southern lines of the ground to be filled in for the park.

the eastern and social and also fill in the space between the park. Furnish material to fill, and also fill in the space between chizan avenue and the retaining wall along the western

9. Furnish material to fill, and also fill in the space between lichizan avenue and the retaining wall along the western ne of its right-of-war, 10. To release to the city two filled in projections into the kee at the foot of Peck court and Hurrison street. In consideration of the foregoing the Illinois Central is to ave the right to fill in and use certain portions of the Lake ont, amounting to 8.13 acres in all, between Randolph street and Park Fow.

and Park Pow.

This agreement is conditional upon the granting of riparian rights by the Illinois Central to the city in a strip 200 ft. long measured on the north and south line immediately south of Park Row. This, the railroad company is willing to do after filling in for their possession a tract of land there amounting to about 1.81 acres. The city further is not to obstruct this space which the railroad company wishes to have as a harbor for vessels. There is not much question about the foregoing terms being acceded to by the City Council which will meet the 16th of September.

Union Elevated Loop. Chicago.

# Union Elevated Loop, Chicago.

Union Elevated Loop, Chicago.

On Saturday, Aug. 31, excavations were begun on Fitth avenue for the foundations of the columns of the superstructure of the Union Loop, which is to form the terminal of the elevated railroads in Chicago. This elevated loop, to which there has been so much opposition from property owners, will connect with all the elevated railroads and afford the means of reaching the business center of the city, which, up to this time, has been lacking. The route will be south on Fifth avenue from Lake to Harrison street, east on Harrison to Wabash avenue and north on Wabash to Lake street, that portion of the Lake street elevated extension from Fifth avenue to Wabash forming a part of the loop. Angus & Guidele have the contract for the foundations. Arrangements have not yet been completed for the operation of this loop and it is not known whether each elevated railroad will be allowed to run its own equipment over the loop or whether the Union Loop Company will furnish their own equipment and inaugurate a transfer system.

## BRIDGE BUILDING.

Cas-elman, Ont.—J. M. Shanley, C. E., contractor for the new iron bridge over the Watson River, states the bridge will be ready for traffic by Oct. 1.

Duluth, Minn.—Plans have been made for a steel viaduct on Garfield avenue, Duluth, 1,280 ft. long and 53 ft. wide, of 57 spans, to cost about \$150,000. It will cross the tracks and yards of the St. Paul & Duluth, Northern Pacific and Duluth Terminal Co., and they are expected to pay nearly all the cost.

Germantown, Pa.—The Philadelphia & Reading has invited bids for the erection of a new iron girder bridge at Germantown, on the line of its Germantown & Chestnut Hill branch. The new bridge will be a double track structure, about 70 ft. long, and will replace the present single track bridge.

Johnstown, Pa.—Nine bids for the erection of the superstructure of the Maple Avenue bridge were opened by councils last week. All bids were rejected and the city engineer instructed to readvertise for bids for a cheaper bridge, according to his plans and specifi-cations.

Lynchburg, Va.—The Pencoyd Bridge Company has just completed a handsome bridge for the Southern Railway over the James River, near Lynchburg. There are four spans, making a total length of about 660 ft. The same company is replacing a wooden bridge over Stanton River. Both bridges are fine specimens of modern bridges for heavy traffic.

Ottawa, Ont.—Action is being taken to secure the construction of a steel bridge to span the Rideau Canal at Somerset street. The bridge will cost \$25,000.

The contract for building the Cedar street bridge has been awarded by the Electric Railway Co. to Mr. Hibbard, C. E. The bridge span will be built to allow four railroad tracks to pass under it.

Statesville, N. C.—A company has been formed at this place to make certain improvements, including the building of an iron bridge across the Catawba River at Statesville, to cost several thousand dollars. For plans and specifications address Geo. H. Brown, Statesville, N. C.

Warren, Pa.—These bids have been opened for the construction of the superstructure of the new iron bridge across the Allegheny River, between Warren and Pleasant Township. The first-named figure is according to the borough plan, and the latter figure according to the bidder's plan: Gustav Kaufman, \$21,000, \$21,000; Variety Iron Works, \$19,864, \$17,266; Wrought Iron Bridge Co., Canton, O., \$18,400, \$16,900; Nelson & Buchanan, Chambersburg, Pa., \$18,400, 13,860 and \$15,689; Youngstown, O., Bridge Co., \$18,500, \$20,400; plan C., \$24,600; Massillon, O., Bridge Co., \$18,581, \$16,192; New Columbus

Bridge Co., Columbus, O., \$23,737, \$17,284; King Bridge Co., Cleveland, O., \$22,847, \$19,000; Rochester Bridge Co., Rochester, N. Y., \$20,000; Groton Bridge Co., Groton, N. Y., \$17,310; \$14,430; Penn Bridge Co., Beaver Falls, Pa., \$18,890; Toledo Bridge Co., Toledo, O., \$23,650; Owego Bridge Co., Owego, N. Y., \$17,500, \$15,000.

#### RAILROAD LAW-NOTES OF DECISIONS.

RAILROAD LAW-NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is said that an officer of a railroad company engaged in interstate commerce who, as a personal favor, issues to a person not within any of the exceptions contained in the interstate commerce act, section 22, a free pass for transportation from one state to another, is guilty of unjust discrimination, in violation of section 2 of that act, making the charging of a less rate to one person than to another for the same services, unjust discrimination.

The Supreme Court of Pennsylvania holds that a recital in a deed granting a right of way to a railroad company, that the grantor has been fully paid for the damage done or which may be done to her property by the location and construction of the railroad, does not take away the grantor's right to have her damages assessed according to law, where the railroad company has not fulfilled a condition in the deed, requiring it to complete the road within a specified time.

In the Federal Court it is held that a railroad company, as a carrier, is not bound, at common law, by the establishment and maintenance for any length of time of a switch connection of its main line with a private warehouse, forever to maintain it.

In New Jersey it is ruled that where a contractor is to be paid for building a railroad in the bonds of stock of the corporation as the work progresses, in determining the amount of stock paid for by him in work and materials actually paid for by the contractor can be taken into account, even if stock paid for, but not issued, can be considered, snee the corporation is liable for the labor and materials not paid for.

The Supreme Court of Minnesota declares that intoxication by a railroad engineer to such an extent as to imperil the safety of passengers justifies his discharge.

In the Federal Court of Minnesota declares that intoxication by a railroad engineer to such an extent as to imperil the safety of passengers.

In the federal Court of the defe

The Federal Court rules that a railroad engaged in interstate commerce, can make an exclusive contract with a connecting carrier for through billing and rating. 

Injuries to Passengers, Employees and Stangers.

In Texas it is held that where the evidence shows that defendant had given reasonable publicity to a regulation forbidding the taking of passengers on freight trains, though there is evidence tending to show that conductors had at various times violated such regulation, if it appears that the company had used reasonable efforts to enforce obedience thereto it is not liable for the death of one riding in violation of the rule. 

In Alabama a brakeman ordered by one in charge of the train to remain at a certain brake is guilty of contributory negligence if he attempts to pass over a car to another brake, and is injured in consequence of such disobedience of instructions. 

The Supreme Court of Missouri rules that where there was evidence that defendant had posted a rule forbidding switchmen and other employees from boarding approaching switch engines from the middle of the track, it was proper to charge that it was defendant's duty to make reasonable rules for the guidance and instruction of its switchmen, and that it was the duty of the switchmen to use due care in acquainting themselves therewith. 

In Illinois it is held that a car repairer, while at work on the repair track, on which no switching is done, who was injured by a car being knocked over by being struck by a leaning car moving on a neighboring track, had a right to assume that the cars on the repair track would not be disturbed. 

In Alabama a freight brakeman failed to stoop as his train passed under a bridge, and was knocked from the train and killed. The accident occurred at midday. The bridge was not obscured. It had stood there for many years, and the fact that it was dangerously low was apparent. The brakeman had been warned of its dangers by both defendant and a co-employe, and had passed safely under it over 100 times, and each time

not waive a rule, prohibiting brakemen from coupling and uncoupling cars except with a stick, by ordering a brakeman to go between cars, and place in position, by hand, a bent coupling link, which cannot be controlled with coupling sticks. <sup>17</sup>

In Iowa, where the blocks of wood necessary for doing certain work can be picked up at any time around the workshop, the failure of the master to specially furnish them does not render him liable for injuries to an employe, caused by their nonuser. <sup>18</sup>

In Virginia it is not negligence to run a freight train through a village of 200 inhabitants at 20 miles per hour, where it is not shown that the train was improperly equipped with brakes and brakemen. <sup>19</sup>

In Indiana it is held that a finding that plaintiff's view and hearing of an approaching train were cut off 375 ft. before reaching the tracks; that he proceeded slowly until his horses passed to the end of a box car, when he checked them, looked north 100 ft., which was as far as he could see, without seeing or hearing the approaching train, and then started forward, and, when he had passed the west side of the car, looked north, and saw the train approaching at 45 or 50 miles an hour, and instantly endeavored to stop his horses, then 10 ft. from defendant's main track—does not show contributory negligence. <sup>20</sup>

In Michigan the running of a passenger train on schedule time across a highway in a city of 17,000 is better.

In Michigan the running of a passenger train on schedule time across a highway in a city of 17,000 inhabitants at a rate of 25 miles an hour is not, in the absence of an ordinance limiting the speed to a lower rate, negligence

ordinance intending the speed to a lower rate, negligance parse. <sup>21</sup>
In Missouri a railroad does not assume liability to children playing in its yard because it has directed its employees to keep the children out of the yard. <sup>22</sup>
In California a person's negligence in attempting to cross ahead of a train which he saw or heard approaching is not affected by the fact that it was running unusually fast. <sup>23</sup>

[Towns they where a well-read permitted]

cross ahead of a train which he saw or heard approaching is not affected by the fact that it was running unusually fast. 23

It is held in Texas that where a railroad permitted weeds to grow along its track, so as to obscure the view of an approaching train to a person approaching a crossing, and one of its trains, running at a high rate of speed, without blowing the whistle or ringing the bell, struck and killed plaintiff's husband, who, without contributory negligence, although those in charge of the locomotive used all possible effort to stop the train. 24

The Wisconsin statute which makes it unlawful to walk along the track of a railroad, does not apply to a licensed path in and about depot grounds. 25

The Texas statuts requiring a bell or whistle to be sounded on a locomotive engine 80 rods from where the railroad "shall cross any public road or street," requires such bell to be rung, though the crossing be above grade. 26

In California it is held that an engineer who sees that the driver of a team rapidly approaching a crossing does not observe the approaching train, and that there will be a collision unless the team stops, is not negligent in giving signals when both are near the crossing, though the horses are frightened thereby. 27

The Supreme Court of Michigan rules that a pedestrian struck by a passenger train at a railroad crossing, who could at any point within 48 ft. of the track have seen the train along the track for a distance of 425 ft.. was guilty of contributory negligence, though the gate would have seen the train. 28

In Texas it is held by the Supreme Court that it was error to refuse to charge that persons operating a railroad train across a public crossing should use ordinary care to prevent collisions with persons at such crossing, and persons approaching such crossing should use the same ordinary care, and, if a collision occurs, and both parties fail in their duty, as defined above, neither can recover from the other, and that by "ordinary care" is meant such care as a reasonably

1 Re Charge to Grand Jury, 66 Fed. Rep., 146.
2 Bredin v. Pitts. & W., 32 Atl. Rep., 39.
2 Jones v. N. N. & W. V., 65 Fed. Rep., 738.
4 Baker v. Guarantee Co., 31 Atl. Rep., 174.
5 Smith v. St. Paul & D., 62 N. W. Rep., 392.
6 Central Trust Co., v. Ch., C. & A., 65 Fed. Rep., 264.
7 State v. Johns, 27 S. W. Rep., 115.
6 Kelly v. C., M. & St., P., 61 N. W. Rep., 957.
9 C. & A. v. People, 38 N. E. Rep., 552.
10 St. Louis Drayage Co. v. L. & N., 65 Fed. Rep., 39.
11 S. A. & A. P. v. Lynch, 28 S. W. Rep., 152.
12 L. & N. v. Woods, 17 South. Rep., 41.
13 Francis v. K. (113, St. J. & C. B., 30 S. W. Rep., 129.
14 Sr. L., A. & T. H. v. Holman, 39 N. E. Rep., 573.
15 L. & N. v. Banks, 16 South. Rep., 517.
16 Bryant v. N. Y. Cent. & H. R., 30 N. Y. S., 737.
17 R. & D, v. Finley, 63 Fed. Rep., 228.
18 Hatbaway v. III. Cent., 60 N. W. Rep., 631.
19 Johnson v. C. & O. Co., 21 S. E. Rep., 594.
21 Tobias v. Mich. Cent., 61 N. W. Rep., 514.
22 Barney v. H. & St. J., 28 S. W. Rep., 1069.
23 Pepper v. South Pac., 38 Pac. Rep., 974.
24 H. & T. C. v. Poras, 29 S. W. Rep., 194.
26 Mason v. Ch., 81. Paul, M. & O., 61 N. W. Rep., 300.
27 Popp.r v. South. Pac. Co., 38 Pac. Rep., 974.
28 K. & T. Ly, Co. v. Thomas, 28 S. W. Rep., 139.
29 C. K. & T. Ly, Co. v. Thomas, 28 S. W. Rep., 194.
20 K. & T. Ly, Co. v. Thomas, 28 S. W. Rep., 194.
20 C. K. & S. F. N. Y. Ounger, 29 S. W. Rep., 948.

# MEETINGS AND ANNOUNCEMENTS.

Dividends on the capital stocks of railroad companie have been declared as follows:

Chicago & Northwestern, quarterly, 13/4 per cent. on the preferred stock, payable Oct. 4.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Canada Atlantic, annual general, Ottawa, Sept. 24. Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 21.

Lo isville, New Albany & Chicago, annual, Sept. 18.

Malone & St. Lawrence, special, New York, N. Y.,
Sept. 12.

Matone & St. Laurine, Spent 12.
Sept. 12.
Minneapolis & St. Louis, annual, Minneapolis, Oct. 1.
Ottawa, Amprior & Parry Sound, annual general,
Ottawa, Sept. 24.
St. Lawrence & Adirondack, special general, Montrea.,
Sept. 13.
Toledo, St. Louis & Kansas City, annual, Toledo,
Sept. 11.

Sept. 11.
Wabash, annual, St. Louis, Mo., Sept. 10.

# Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The National Railroad Master Blacksmiths' Assocition will hold its annual meeting at Cleveland, O., I ginning on Sept. 3, 1895. The programme was publish in the Railroad Gazette of Aug. 16.

The Association of American Locomotive Traveling Engineers will hold its annual convention at the Seventh Avenue Hotel, Pittsburgh, beginning Sept. 10, and lasting till the 14th. C. B. Conger, of Grand Rapids, Mich., is President of the organization, and W. O. Thompson, of Elkhart, Ind., Secretary and Treasurer.

The Master Car & Locomotive Painters' Association will hold its next annual meeting at the Grand Hotel, Cincinnati, Sept. 11, 12 and 13. The programme of this meeting was published in the Railroad Gazette of Aug. 9.

The International Railroad Conference of Young Men's Christian Association is to be held at Clifton Forge, Va., Sept. 13, 14 and 15. Mr. C. J. Hieks, 40 East Twenty-third street, New York City, is Secretary of the Railroad Department of the International Committee. The programme was published in the Railroad Gazette of Aug. 9.

The American Association of General Baggage and Ticket Agents, will hold its semi-annual meeting at Boston, Sept. 17.

The American Association of General Passenger and Ticket Agents, will hold its semi-annual meeting at the Hotel Vendome, Boston, Sept. 17.

The New England Roadmasters' Association will hold its annual meeting at the Hotel Vendome, Boston, Sept. 17.

The New England Roadmasters' Association will hold its annual meeting at the Hovel Vendome Boston, Sept. 17.

The American International Association of Railroad Superintendents of Bridges and Buildings will hold its annual meeting at New Orleans, La., Oct. 15.

The American Street Railway Association will hold its annual meeting at the Windsor Hotel, Montreal, Oct. 15 to 18.

The Roadmaste s' Association of America will hold its annual meeting at St. Louis, Mo., Oct. 15, 16 and 17.

The Rangineers' and Architects' Association will hold its annual meeting at the Windsor Hotel, Montreal, Oct. 15 to 18.

The Engineers' Railway Club meets in Chicago on the third Tuesday of each month, except in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets at the rooms of th

8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 n m.

The American Society of Unit Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The Western Society of Engineers meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736–1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Boston Society of Civil Engineers meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publish ing House, Nashville, Tenn.

The Engineers' Society of Western Pennsylvania meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Association of Engineers of Virginia holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

Only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7.30 p.m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alter nate Thursday, at 8 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O, on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The Engineers' and Architects' Club of Louisville meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The Western Foundry new's Ass ciation meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The Association of Civil Engineers of Cornell University meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

Western Foundrymen's Association.

The next meeting of the Western Foundrymen's Association will be held in Milwaukee on Sept. 18, with head-

quarters at the Plankinton Hotel. Arrangements for the meeting have been made as follows: The start from Chicago will be by the "Goodrich line" steamer, leaving Chicago at 8 p. m., Tuesday, Sept. 17, and arriving at Milwaukee on Wednesday morning; arrangements have been made for a reduced round trip fare at \$1.25, and berths can be procured for 50 cents each way; the first session of the association will be held in the parlors of the Plankinton Hotel, at 9:30 a. m., Sept. 13; a paper will be read by Mr. H. Hansen, on False Economy in Foundry Equipment, and one by Mr. A. Sorge, M. E., the subject to be announced later. After lunch, members and other guests will visit the works of the E. P. Allis Co.; later a ride on the electric road will be taken around the city; at 7:30 p. m. on Sept. 18, a banquet, will be held at the Plankinton Hotel, at which a number of prominent foundrymen will speak. The second day, Sept. 19, will be devoted to visiting other foundries in Milwaukee and seeing the city generally.

It is expected that the attendance at this meeting will be at least 150, and probably larger. Those who intend to be present should notify the secretary, S. T. Johnston, so that he can make arrangements for their accommodations on the steamer and at the banquet.

National Association of Manufac urers.

National Association of Manufac urers.

The date for holding the annual convention of the National Association of Manufacturers, at Chicago, Ill., has been changed to Nov. 19, 1895.

#### New England Railroad Club.

On Wednesday, Sept. 4, the club held its annual excursion, a steamer being chartered for that day, to take the members to Plymouth. The committee in charge was F. E. Barnard, John Medway, Geo. B. Swett, C. J. Post, J. T. Chamberlain, G. H. Wightman, Francis M. Curtis and Edward L. Janes.

#### Central Railway Club.

Central Railway Club.

The next regular meeting of the club will be held at Hotel Iroquois, Buffalo, N. Y., on Friday, Sept. 13, at 2 p. m. Committees will report as follows: Upon "Management of Steam Heat on Passenger Equipment"; "Is the use of a trap necessary or advisable?" E. D. Bronner, Robert Gunn, John S. Lentz. "Comparative Service Derived from Flues in Locomotive Boilers Working with a Steam Pressure of 125 to 140 Pounds when Beiler is Carrying 160 to 200 Pounds."—E. A. Miller, P. E. Garrison, F. B. Smith.

A discussion will take place upon the topical questions submitted by members.

—Mr. Augustus J. Cooke, who for the last seven eight years has been Soliciting Passenger Agent of the Seaboard Air Line, has resigned that position, and had been succeeded by Mr. H. S. Leard.

PERSONAL.

—Mr. W. Cockfield, recently with the Mexican Central Railroad, has been appointed Superintendent of Locomotive and Car Service on the Interoceanic road of Mexico, his headquarters being at Pueblo, Mex. He succeeds Mr. W. K. Barclay, who was Superintendent of

—Mr. J. G. Miller, Assistant General Freight Agent of the Atchison, Topeka & Santa Fe., has resigned to accept the position of Manager of the Chicago department of the Laffin-Rand Powder Co. J. E. Gorman, at present chief clerk of the freight department of the Atchison, has been promoted to fill the vacancy caused by Mr. Miller's resignation.

—Mr. Morris Rutherfurd has been promoted from the office of Assistant General Freight Agent of the Lehigh & Hudson River road to be General Freight Agent. He succeeds Mr. Frank E. Smith, who has held the office of General Freight Agent since 1884. Mr. Smith was previously Assistant General Freight Agent of the road, and had been in the service of other roads, chiefly in the traffic department, for many years.

rame department, for many years.

—Mr. E. W. Jackson, General Manager of the Interoceanic road of Mexico, died in the City of Mexico last
week, after a short illness. Mr. Jackson had accepted
office with the Interoceanic in September a year ago, resigning from the Mexican Central. He was well known
through his long connection with that road, of which he
had been General Manager since 1885. Previously he
had been General Manager of the Mexican & Vera Cruz
road for 10 years.

-Mr.C. H. Roser, of Lima, O., has been appointed Super-intendent of the Ohio Southern road and will have charge of the operating department. The office of General Superintendent, formerly held by Mr. J. H. Barrett, has been abolished. Mr. Barrett is General Superintendent of the Cleveland, Akron & Columbus road, and when President Saul, of that company, was appointed Receiver of the Ohio Southern his jurisdiction was extended over the latter road. Other receivers having been recently appointed Mr. Barrett retires from the service of the road. Mr. Roser, the new Superintendent of the Ohio Southern, was formerly Superintendent of the Columbus, Hocking Valley & Toledo road.

bus, Hocking Valley & Toledo road.

—Mr. Henry S. Welles, well known as a contractor of large public works, died in New York City on August 28. His firm had carried out very many large contracts, including a \$5,000,000 contract on the Brooklyn Water Works. During most of his business life, however, he was engaged in railroad construction, his first important contract being about 27 miles of the Great Western road in Canada. The firm of H. S. Welles & Co. built over 100 miles of the Eric road, a 20-mile section on the New York Central, about 40 miles on the Buffalo & State Line road, now the Lake Shore; some 50 miles on the Delaware, Lackawanna & Western, involving some particularly heavywork, and about 40 miles of the Northern Railroad of New Jersey.

## ELECTIONS AND APPOINTMENTS.

Canton & Wooster.—The incorporators of the company are: Ex-United States District Attorney Robert S. Shields, T. H. Phillips, M. E. Aungst, L. H. Koch and E. S. Raff, of Massillon, O. Kane & Elk.—The incorporators of this new Pennsylvania company are H. J. James, Kane, Pa., President, and T. S. James, W. A. James, E. B. James, W. H. Davis, A. P. Huey, all of Kane, Pa., and D. M. James, New Haven, Conn.

Lehigh & Hudson River.—Morris Rutherfurd has been appointed General Freight Agent, vice Frank E. Smith, resigned; and Howard G. Pierson, Assistant General Freight Agent, vice Morris Rutherfurd, pro-moted, both with office at Warwick, N. Y.

Livonio & Lake Conesus.—The directors of this new company are W. D. Blake, of Tompkinsville, N. Y.; W. E. Ayers and H. W. Ward, of Brooklyn; H. B. R. Potter and E. F. Burns, of Jersey City; C. P. Moore, of Passaic, N. J., and C. G. Burnett, of Bayonne, N. J., and David L. Gray and F. D. Hunter, of New York.

and David L. Gray and F. D. Hunter, of New York.

New England.—This is the new name of the New York & New England. The following directors to servé for the new company were named by the Reorganization Committee of the New York & New England last week; Grant B. Schley, W. H. Porter, Gordon Abbott; Amos T. French, Stephen M. Weld, David S. Plume, Edward D. Robbins, James M. Ripley, John Henshaw. The officers are: Grant B. Schley, President; Gordon Abbott, Vice-President: J. T. Odell, Second Vice-President and General Manager; Amos T. French, Treasurer; W. H. Porter, Secretary; George B. Phippen, Assistant Treasurer; James W. Perkins, Assistant Secretary; W. H. Dudley, Auditor; L. B. Bidwell, Chief Engineer. The new directors took charge of the property Sept. 1, and will manage its affairs until their successors are elected at the first stockholders' meeting of the new company, which will be held early in November.

Philadelphia, Reading & New England.—J. Farrell,

Philadelphia, Reading & New England.—J. Farrell, of Maybrook, N. Y., and W. Beard, of Poughkeepsie, have been appointed roadmasters, vice G. W. Sullivan and W. F. Barry, resigned.

and W. F. Barry, resigned.

Port Jervis, Monticello & New York.—At a meeting of the stockholders of the company, at Port Jervis, N.Y., Sept. 3, the following officers were elected: President, Charles D. Haines, Kinderhook, N.Y.; Vice-President and Secretary, Lafe Pence, Kinderhook; Treasurer, Andrew G. Haines, Port Jervis; Assistant Secretary, W. E. Scott, Port Jervis. The new directorate includes Charles D. Haines, Lafe Pence, A. G. Haines, Elmer T. Haines, Charles F. Crisp, of Georgia, Speaker of the House of Representatives; Moses T. Stevens, of Massachusetts; W. A. Stünchoomb, of New York; O. P. Howell, W. F. Scott, Benjamin Ryall, P. E. Farnum and S. D. Lake, of Port Jervis.

Reynoldsville, Warren & Buffalo.—The incorporation of this company was noted last week—The first directors are: S. B. Elliott, Reynoldsville, Pa., President; F. M. Brown and Joseph M. Hammond, Reynoldsville; John Reed and Frank H. Beck, Dubois, Pa.; Geo. H. Lewis, Charles Clifton and R. W. Macpherson, Buffalo, N. Y.

# RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

California, Phænix & Eastern.—The contract for grading the first 10 miles of this line out of Phœnix, Ariz., will probably be let during the present month. The road is projected by the Fowler Co., of Phœnix, which is largely interested in the Phœnix mining district. The right of way has been secured for 19 miles out of Phœnix, and ground for terminals in that town has also been purchased. At the end of the present right of way the company will connect with the projected line of the Aqua Fira & Hassayampa road, which owns the right of way to and through Sydney and thence west through the Gila Valley. L. Fowler is President of both companies, and Henry S. Fowler is Secretary.

C. N. Nelson Lunder Co.—This company has let the contract for a standard gage road 25 miles in length in Minnesota, and 300 men are at work. The line will be extended and will reach some of the finest pine lands of Northern Minnesota. The first 25 miles will open 75,-000,000 ft. of pine.

Dahlonega.—A charter has been granted the company to build a road from Dahlonega to Lula or Gainesville, Ga. The capital stock is \$300,000. The purpose is to develop large fields of copper pyrites. The incorporators are George W. Scott, C. M. Candler and N. P. Pratt, of Atlanta; W. A. Charters, W. P. Price, W. G. Boyd and F. W. Hall, of Dahlonega; A. G. Jennings, of New York, and G. J. Baldwin, of Savannah. The Chestates Pyrites Company, owners of copper mines near Dahlonega, are the moving spirits. Dahlonega, it is said, has raised \$20,000, to be paid when trains are running. Maj. C. M. Bolton, formerly Chief Engineer Southern Railway, is at the head of a party making the preliminary survey. The road will be about 30 miles long.

Denver, Lakewood & Golden.—This company is negotiating to obtain financial aid in order to extend its line into the Louisville coal district north of Golden, Col. In the event of this project being consummated the company will abandon its electric motive power, and will run steam cars into the Union station by trackage agreement with some railroad.

Drummond County.—Work on this road is being pushed rapidly ahead. A large gang of men is at work on the extension from Moose Park, in the direction of Chaudiere, where a junction with the Intercolonial Railway is to be made. With regard to bridging the Chaudiere River, the company has not yet decided whether it will build its own bridge or use the Grand Trunk structure.

Florence & Cripple Creek.—The line resumed business on Sept. 5 after a month of loss of traffic due to the great washout which carriedaway seven miles of track and grade and 16 bridges. The new line constructed in Eight Mile canon is run higher from the bed of the creek, and is cut out of the rock instead of being built of dirt along the sides of the stream. The surveys in preliminary construction plainly showed that no large body of water had ever come down this canon—at least not for many years. It is now supposed that the great amount of blasting being done in the Cripple Creek district has changed conditions so that washouts and cloudbursts may hereafter he expected during rainy seasons.

IKane & Elk.—This company was chartered Sept. 3, at Harrisburg, to build a road from a connection with the Philadelphia & Erie and the Pittsburg & Western, near Kane, in McKean County, Pa., to a connection with the Tionesta Valley road in Highland Township, Elk County, Pa. The length of the road will be about 10 miles. H. J. James, of Kane, Pa., is President.

J. James, of Kahe, Pa., is Fresuent.

L vonia & Lake Conesus.—This company was incoporated in New York last week to operate a standa gage steam road six miles in length from Livonia. Likingston County, northwest to Lakeville, Conesus Lak The capital is \$50,000, and the Directors are: David Gray and F. D. Hunter, of New York City, and others.

Manistee & Grand Rapids.—The company has just completed tracklaying on an extension of 3.29 miles from the south limits of the city of Manistee, Mich., to the Manistee River at Spruce street, which is to be the western terminus of its line.

Midland Terminal.—Track is now laid to Anaconda, two miles from Cripple Creek, the terminus of the line.

The route of the Midland Terminal through the Cripple Creek district passes all the big shippers and the most important hills in which mineral has been located. By building short spurs, cars can be loaded at the mine dumps in many cases. The Midland Terminal has been doing a very satisfactory freight and passenger business.

Minneapolis, St. Paul & Ashland.—This road has been voted aid in the counties through which it is designed to pass, in Northwestern Wisconsin, and \$220,000 has been subscribed along the line by individuals. It is stated that construction will begin this fall. The road is intended to connect the cities mentioned in its name, but is not likely to be built this season.

North Carolina Midland.—An effort is being made to have this road extended from Mooresville to Mocksville. It is controlled by the Southern Railway, and a meeting of the stockholders was held at Winston, N. C., last week, at which the Chamber of Commerce of that place asked the stockholders to urge upon the company the plan of building this extension. The stockholders adopted resolutions favoring the extension. The distance from Mooresville to Mocksville is 30 miles, and about 15 miles of the proposed line was graded several years ago. The building of this 30 miles would complete the last section, giving the Southern Railway two routes—between Greensboro and Charlotte, N. C., one via Salisbury (the present one, which is a part of the main line), and the other (the one now preposed) via Winston, Salem and Mocksville.

and Mocksville.

Northern Pacific.—This road is making very extensive improvements to permanent way, and is to lay this vear 200 miles of new rails. In the Rocky Mountain and Cascade divisions all the old high wood trestles are being replaced by steel structures or filled solid. Two principal trestles, too high to be filled, are to be rebuilt with steel, and all the rest at the mountain summits will be filled. The material used in filling is removed and deposited in place by hydraulic jets and sluicing through flumes. Five long trestles have been thus filled, and since the work began some 42 miles of trestles and timber bridges have been filled. The grades are also being cut down, and considerable other improvements have been made in Montana and Western sections. Permanent brick linings are being completed in all the tunnels and in place of timber there are concrete and hard burned brick. All the tunnels are being lighted by electricity.

Pittsburgh, Wheeling & Monongahela.—Gen.W. G.

the tunnels are being lighted by electricity.

Pittsburgh, Wheeling & Monongaheln.—Gen. W. G. Dacey, of New York, President of the company, in talking recently of the affairs of this company, said: "The location made by Chief Engineer A. D. Neeld has been formally approved. It is that portion of the line extending from the Pittsburgh & Lake Eric Railroad, on the eastern side of the Monongahela River, opposite Monongahela City, across the Monongahela River to Clarkstown, in Washington County, a distance of about 25 miles. The company expects to be ready to let the construction of the road soon and intends to begin work at an early day." The road will extend through valuable coal fields and will ultimately be built to Wheeling, W. Va., a distance of 50 miles.

San Jose & Alviso.—Articles of incorporation of the railroad were filed at San Jose, Cal., last week. The company will build a road from Alviso to San Jose, From San Francisco a regular line of bay steamers will run to Alviso, conveying freight from Oakland, Vallejo, Berkeley and other bay points in opposition to the Southern Pacific.

ern Pacific.

Union Pacific, Denver & Gulf.—Efforts will be made to keep the Alpine tunnel open for traffic all winter. The track for three miles east of the tunnel will be protected by snow sheds, and where in the past sheds have been carried away by slides, the sheds will be constructed so as to shunt the avalanches overhead without carrying away the sheds. On the western side the sheds will be constructed most carefully to avoid this danger. One difficulty hard to contend with is the seepage of water within the tunnel which freezes and thus blocks the track. This ice must be almost daily chopped away.

Washburn, Bayfield & Iron River.—There will be

Washburn, Bayfield & Iron River.—There will be a bond election for the benefit of this project in Bayfield County, Wis., shortly, the company asking \$240,000. The line of the proposed road will connect the towns mentioned in its name and the road will open a rich pine timber and farming section.

# GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The suit of the Chicago Elevated Terminal Railway, which was noticed in these columns two weeks ago, was settled by the Receivers of the Atchison last week, so that the decree for the foreclosure of the Atchison property would not be delayed. The terms of the settlement are not made public It is said that one outcome will be the sale of the Atchison freight terminals in Chicago which occupy valuable frontage on State street south of Twelfth street, and which are valued by some as worth over \$10,000,000.

Chicago, Burlington & Quincy .- The company re

	Gross earn Oper. exp		1894. \$2,456,595 1,608,232	In I. I.	c. or Dec. \$62,198 67,268
	Net earn	\$843,291 815,000	\$848,363 797,247	D. 1.	\$5,072 17,752
1	Surplus	\$28,291	•	D.	\$22,821
1	Gross earn Oper, exp	\$16,392,700 lu,954,504	\$17,616,734 11.461,241	D. D.	\$1,224,034 506,636
	Net earn Fixed charges		\$6,155,595 5,589,733	D. I.	\$717,398 121,266
4	Deficit div. for seven months	1,913,429	Sur. \$574,860	I.	\$8:1,664

July freight earnings were \$1,493,001, a decrease of 20,107. In 1894 the decrease was \$154,647. Passenger earnings were \$690,439, an increase of \$63,796. In 1894 the decrease was \$341,649.

Chicago, Milwaukee & St. Paul.-The earnings for

Gross earn	1895.	1894.	Inc.
	\$2,283,240	\$1,779,226	\$510,014
	1,552,246	1,401,056	151,190
Not corn	\$736 994	\$378 170	\$358 811

Cleveland, Akron & Columbus.—It is announced this week that the control of this property has been secured by Senator Calvin S. Brice, President of the Lake Erie & Western. He has been elected President of the company, succeeding Mr. George W. Saul, and directors nominated by Mr. Brice will be elected to fill the places of certain directors representing the stockholding interest of President Saul, and the Holland security

holders, heretofore represented by him where securities have been purchased by Senator Brice. The control of this road by Senator Brice is in the interest of the Lake Erie & Western, and naturally follows the acculsition for that company of the Pittsburgh, Akro. & Western, now called the Northern Ohio road. By securing control of the Cleveland, Akron & Columbus road the Lake Erie & Western will secure a direct route into Cleveland from Akron, the eastern terminus of the Northern Ohio road.

Georgia Southern & Florida,—The earnings of this road for the year ending June 30, 1895, were: Gross earnings, 8843,560, an increase of \$12,507 over the preceding year; net earnings, \$228,595, an increase over the previous year of \$47,710.

ings, \$843,000, an increase of \$12,000 over the previous year of \$47,710.

Lynchburg & Durham.—A North Carolina correspondent of the Railroad Gazette sends us some interesting facts, which he has learned by having access to some legal papers, including a copy of the record of the United States Circuit Court for the Eastern District of Virginia, in a suit of the Fidelity Trust & Safety Deposit Co. against the Railroad Company. This document recites that the Norfolk & Western and its Receivers defaulted in the payment of interest due on July 1, last, and that by the terms of the lease, the property thus reverted to the Lynchburg & Durham stockholders. The road continues to be operated by the Norfolk & Western Receivers, the Pennsylvania Construction Co., of Philadelphia, which controls a majority of the scock of the Lynchburg & Durham, agreeing to the continued operation by the N. & W. The Court records, alluded to above, include the report of Henry Fink and F. J. Kimball, the Receivers of the Norfolk & Western, as to the earnings of the Lynchburg & Durham for the years 1892, 1893 and 1894, as follows: 1892, 1815, 163, 1893, 1863, 474; 1894, \$150,022. The net earnings for these three years were, respectively. \$26,394, \$19,803, \$8,129. The interest liability of the Norfolk & Western on account of the Lynchburg & Durham, by the lease, is \$76,500 a year, taking no account of \$482,000. The record shows that the Receivers asked permission to notify the Lynchburg & Durham Company, and the Mercantile Trust Co., of New York, that they would be unable to pay the interest charged and comply with the other terms of the lease. The request was granted by Judge Hughes and the notice was served on the company and the trust company some time ago. The interest due on July 1, last, was defaulted on, as stated above. The Lynchburg & Durham & Northern Railroad. Durham is a large tobacco and cotton manufacturing town with a large freight traffic.

Northern Pacific.—Last Monday the United States District and Circuit Judges, sitting at

tobacco and cotton manufacturing town with a large freight traffic.

Northern Pacific.—Last Monday the United States District and Circuit Judges, sitting at Seattle in the State of Washington, rendered decisions which may have an important bearing on the Northern Pacific organization. Mr. Brayton Ives, President of the Northern Pacific, filed a petition in the United States Circuit Court for the District of Washington, asking that the order appointing Messrs. Oakes, Payne and Rouse as Receivers be vacated. The question was ordered on the point whether or not the court should entertain the petition at all. No argument was had on the merits. The petitioner claimed that the United States Circuit Court for the Eastern District of Wisconsin, in which the Receivers were appointed, had no jurisdiction, and that all proceedings in that court, including the appointment of Receivers, and the authorization of Receivers certificates, were void. The first reports said that the Washington decision sustained the petitioner in these claims. The decision of the judges, Hanford and Gilbert, is, however, that the Wisconsin Court had jurisdiction and that the appointment of the Receivers was regular and valid, that the acts of these Receivers were valid, as are of course the certificates issued under the orders of that court; but is is held that as no part of the railroad is now in the Eastern District of Wisconsin the Washington Court is not required to send the matter to the Circuit Court of the Eastern District of Wisconsin. Therefore the judges retain the Ives petition and require the Receivers to answer within 30 days the charges brought against them. Certainly it would have been a great misfortune if the validity of the certificates already issued, amounting to \$5,000,000, were impaired.

New Fngland.—The Reorganization Committee, and the purchasers of the New York & New England at the

New Fngland.—The Reorganization Committee, and the purchasers of the New York & New England at the recent foreclosure sale turned over all the property in their control to the new company which has been organized in the name of the New England Railroad Company, on Sept. 1. The transfer was made by Receivers Platt and Perry in pursuance of the decrees of the United States Circuit Court. The new company has been organized with G. B. Schley, of New York, as President and J. J. Odell, Vice President and General Manager. The other officers are given in another column, but no important changes have been made from the previous organization of the company.

Penusylvania —The statement of earnings of the Eastern lines for the month of July makes the following comparisons:

Gross earnOper. exp		1894. \$4,812,568 3,403,844	Inc. \$656,070 505,055
Net earn	\$1,559,733	\$1,408,719	\$151,014

Net earnings in 1893 were \$1,530,409; in 1892, \$1,393,167; in 1891, \$1,775,184; in 1890, \$1,355,465; in 1889, \$1,855,656; and in 1888, \$1,598,410. The Western lines for July show a gross increase of \$630,346 and a net increase of \$322,493. The gross increase of the system for July is \$1,286,416 and the net increase is \$473,507.

The Eastern lines for seven months report the following earnings:

Gross earn. \$34,97 Oper. exp	4.135 \$31,00	4. 7.467 I. 7,933 I.	Changes \$3,966.669 3,041,016
Net earn \$9,20	5,187 \$8,27	9,534 I.	\$9`5,653
Net earn'ngs in 1893 we: 701; in 1891, \$10,783,265; in 266,123; and in 1888, \$10,291	1890, \$10,33	1,711; in	1889, \$10,-

296,123; and in 1888, \$10,291,169. The Western lines for the seven months show an increase of gross earnings of \$2,540,190 an increase of \$1,401,393 in net earnings. The system for seven months shows a gross increase of \$6,506,859 and a net increase of \$2,327,046.

86,506,859 and a net increase of \$2,327,046.

Philadelphia & Reading.—Judge Dallas, in the United States Circuit Court, at Philadelphia, has extended until Sept. 15 the time for the filing of the answer of the company to the suit instituted by the Pennsylvania Company for Insurance on Lives and Granting Annuties, as trustee, for the foreclosure of the general mortgage. According to the order made by the court at the time the demurrers to the bill of complaint were dismissed, the answers of the various respondents were directed to be filled by Sept. 3.